



with the introduction of lead into bearing metals, and its condition in these alloys as revealed by the microscope, and to illustrate the same with photographic illustrations. The microscopic study is a new and interesting departure in the testing of bearing metals, and many interesting facts have been developed on this subject. MICRO.

Locomotive Laggings.

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Easy Roads to Science.

New York, Feb. 19.

To the Editor of the "Railroad Gazette:"

I note the letter of "Class of '57" in your last issue, and your appreciative remarks regarding Prof. Merriam's little book on "Strength of Materials." The sale of that book thus far appears to be to that class of engineers who are accustomed to rely on Carnegie, Osborn and other empirical pocketbooks, and, hence, it may prove really useful in starting them on rational methods of thinking. X.

To Reverse or Not?

To the Editor of the Railroad Gazette:

I have read the letters in the Railroad Gazette which you called my attention to, and a number of articles published since on the same subject.

As far as I know, and I think the practice is quite general on our lines [Over 5,000 miles.—Ed.], engineers are instructed not to reverse, but to rely upon the emergency brake altogether. Our views are exactly as you have stated them editorially, that it is not only bad practice, but also a useless source of danger to both reverse and apply the brakes at the same time.

G. M.

A New Method for Testing Bearing Metals.

To the Editor of the Railroad Gazette:

The subject of microscopic metallography has of recent years made remarkable progress, and microscopic examination is fast becoming a factor in testing metals. Chemical analysis can show only the composition of an alloy, but to show the true structure or manner in which the component parts are alloyed is left for the microscope. In the study of iron and steel by microscopic examination, much work has been done and much information obtained, but the microscopic examination of alloys is a comparatively new piece of research.

The physical properties of a sound piece of steel depend exclusively upon its chemical composition and upon its structure, and just so with all other alloys; not only should the component parts thereof be known, but also the manner in which these metals are alloyed, as is shown by the structure. We may take, for instance, bearing metals. We find by chemical analysis that these metals are all very similar so far as chemical composition is concerned, but when we examine their structure under the microscope a vast difference is discovered.

In former years, alloys of copper and tin were used for locomotive and car journals, but to meet the requirements of an anti-friction metal, to be used on the fast trains of the present day, such an alloy is found to be inadequate. To meet this demand for a better metal, lead was introduced into this alloy, and it soon became recognized that lead was the essential anti-friction element. Lead is a metal having scarcely any affinity for copper, and to introduce a large percentage of lead to form a perfect alloy cannot be done by the mere mixing of the same with copper and tin in the proportions used by the manufacturers of so many well known anti-friction metals.

To distinguish between the perfect alloy and a mechanical mixture by the aid of the microscope is an easy matter. It is my purpose in a following issue to deal

Greater care is exercised in protecting the heat-radiating surfaces of average steam plants of great manufacturing establishments than in protecting the corresponding heat-radiating surfaces of the average American locomotive. And yet how infinitely more important is it to thoroughly insulate the heat-radiating surfaces of the locomotive, out in the open air, exposed to all sorts of temperature. Nothing better illustrates the need of completely insulating beyond even the suspicion of a cold current of air every inch of the cylinders, steam chests and steam channels leading to the steam chests, than some experiments made by Thomas Craddock. He demonstrated that the rate of cooling by transmission of heat through metallic surfaces depended largely upon the rate of circulation of air over the surface. In one of his experiments he filled an iron tube with hot water, having a thermometer sustained in the water, and when he moved the tube through the air at the rate of 59 feet per second (40.5-22 miles an hour) it lost as much heat in one minute as it did when resting in still air 12 minutes.

Probably nothing in the way of boiler lagging is so extravagantly wasteful of heat, unless it be some of the so-called air-space coverings, as the practice of putting loops around the boiler and then placing the lagging on the hoops, thus producing an air-space between the boiler and the lagging. This air-space is sometimes referred to as "dead-air space." A positive misnomer. If it is ever "dead" its resurrection follows with lightning-like rapidity. The idea is erroneous, and the man who thinks he will ever save any heat by following that practice will find, if he ever finds anything, that he has been chasing an economic rainbow.

It may be well here to lay down the proposition that in order to realize best results from any lagging of whatever kind it should hug the boiler as snugly as possible. But to depend upon air as a non-conductor of heat it should be held immovable in microscopic spaces. When so entrapped there can be no transmission of heat, except by the comparatively slow process of conduction from particle to particle, a process of transmission so sluggish when compared with convection or diffusive circulation as to suggest a race between a comet and a turtle.

Asbestos and magnesia have been names to conjure with during the past few years, and perhaps this would be an opportune time to remind the members of this club not to be misled by names. When a man or a company puts out a covering the substance of which is supposed to be described by the name it bears I submit that, in all fairness, it ought to contain a sufficient amount of the specified material to justify its name; but such is not always the case. For example, a covering calling itself "asbestos-magnesia sectional covering" actually contained, according to analysis, asbestos fibre 6 per cent., asbestos wool 2 per cent., magnesia 1½ per cent., plaster of paris (sulphate of lime) 75 per cent., the balance of the mixture being organic matter and water.

Another covering, denominated "asbestos cement," contained silicious matter (clay, etc.) 75 per cent., organic matter (pulp) 12 per cent., asbestos 9 per cent., lime $3\frac{1}{2}$ per cent. If this covering had contained 75 per cent. or more of asbestos, instead of that amount of earth, it could not be accused of "sailing under false colors."

Plaster of Paris, or sulphate of lime, is the principal constituent of many of the coverings now found upon the market. Its insignificant cost, the ease and cheapness of molding it into sectional forms, has served to make it more and more relied upon by the makers of low-priced insulating materials. Its price, indeed, is the only quality which can induce any one to employ it. Its lack of stability to resist for any great length of time the action of heat of high temperature, its corrosive action on iron surfaces with which it comes in contact, are drawbacks too pronounced to permit serious consideration of this material by the thoughtful steam users, to whom first cost is not the only consideration. We have only to break up a piece of such covering, mix it with water and immerse a piece of iron or steel in the mixture for a few days to convince ourselves of its detrimental action.

These coverings are never sold as plaster of paris or sulphate of lime. No mention of the fatal component is ever found in the name or literature describing these products. The plaster is alluded to as "a light cementing compound," or "calcite," or "asbestos sponge," or as "magnesia," or "asbestos-magnesia"—most anything except the name that would disclose its real character. In a word, plaster of

* A few extracts from a paper by Mr. Wallace W. Johnson, read at the February meeting of the New York Railroad Club.

paris can only be mentioned to be condemned in connection with the subject of locomotive boiler lagging.

Among the many uses for which asbestos is employed is the jacketing of heated surfaces for preventing radiation. It had long been known that sheep's wool, cotton wool, hair felt and other organic fibrous matter possessed great virtues as non-conductors of heat. The large proportion of entrapped air within the interstices of the fibres gives to such materials a power for insulation unknown in the past in mineral substances. No wonder, then, that the use of asbestos as a lagging should have seemed so full of promise. Experience soon taught us though, that one very vital quality possessed by the organic fibres, namely, elasticity, was lacking to a very considerable extent in asbestos fibres. Light, fleecy asbestos fibres make a very excellent non-conductor if properly made up; but the vibrations, concussions and mechanical stresses to which boiler coverings are subjected soon break down the air-entrapped structure of asbestos wool, leaving a matted mass of mineral matter, sadly lacking the heat-entrapping air cells.

About sixteen years ago Prof. J. M. Ordway, at that time connected with the Massachusetts Institute of Technology, made a very exhaustive investigation at the instance of the Boston Manufacturers' Mutual Fire Insurance Company regarding the non-heat-conductivity of a number of materials. In commenting upon some of the materials he had been testing, especially those of a fibrous character, he said: "These substances keep the air still by virtue of their fibres or particles. The asbestos had smooth fibres which could not prevent the air from moving about. Later trials with an asbestos of exceedingly fine fibres have made a somewhat better showing, but asbestos is really a poor non-conductor. By reason of its fibrous character it may be used advantageously to hold together other incombustible substances."

There are elements recognized as necessary to perfect lagging other than that most important one of non-conductivity of heat. Among the chief of these are freedom from corrosive acids, durability, ease of application, structural strength to withstand frequent removals and re-applications. As the question of expense in replacing lagging is involved, of essential importance regarding the value of a material is the ability to withstand during the life of the boiler and cylinders the disintegrating effects of the action of heat, as well as of the vibration and jarring incident to locomotive action.

Mine.al wool consists of the slag from iron furnaces blown into a fibrous condition when melted. If examined under the microscope tiny little glass bulbs will be discovered. It is really a kind of glass, the needles or fibres of which are finer than cotton fibre. It is an excellent non-heat conductor when in a fluffy condition by reason of the large amount of entrapped air it will hold; but when converted into a solid condition it becomes a rather quick conductor.

Prof. Ordway, in his report, referred to this fact, and in a recent report issued by the Boston Manufacturers' Mutual Fire Insurance Company for December, 1897, occurs the following caution: "The next point is that in this case reliance had been placed upon a covering of mineral wool inside the wooden casing, which may justify the retention of this particular wooden lagging, it being commonly held that a covering of mineral wool is a sufficient non-heat conductor to make the outside wood safe from the fire. That is true so long as the mineral wool remains in a light and fluffy condition holding entrapped air, it being the entrapped air which is a non-heat conductor and not the substance of the mineral wool itself, which is an impure kind of glass blown from the slag of iron furnaces. The objection to this kind of material is that under constant vibration it gradually becomes more and more solid, leaving the upper part of an engine, cylinder or pipe partially uncovered, while below, where it becomes condensed, it become more and more a good conductor of heat. This case appears to be a clear example of the fault in this type of boiler and pipe covering."

Fossil meal, which is the diatomaceous earth found under peat bogs, is a fairly good non-heat conductor.

Magnesium carbonate, popularly known as magnesia, possess the quality of porosity to a higher degree than any other mineral. One hundred volumes of carbonate magnesium will hold entrapped from 25 to 90 volumes of air. It is by virtue of this great proportion of air cells that it possesses its well-known heat insulating qualities. In the magnesia covering placed upon the market we find asbestos fibre to the extent of about one-tenth of the weight of the covering. The office of the asbestos, as previously indicated, is, by reason of its fine fibrous character, to lend mechanical strength to the covering while the magnesia furnishes the insulating property.

English Electric Tramway Work.

In a presidential address recently delivered before the Northern Society of Electrical Engineers at Manchester, Eng., Mr. J. S. Raworth, said: "I do not intend to discuss the question of electrical transmission of power for main lines of railroads. I leave that to my succe-

ors. I would rather direct your thoughts to the more pressing question of tramways and light railroads. Hitherto we have done next to nothing, and the small experiments which have been undertaken have been carried out almost entirely with American machinery. Even under these conditions the results have been satisfactory. We must not, however, lose sight of the fact that we possess several home-made electric tramways, including Mr. Holroyd Smith's Blackpool line" [this is the conduit line to which we recently referred as being in course of abandonment in favor of the trolley] "which, although constructed 12 years ago in the face of difficulties not encountered in the case of any other electric tramway in England, has, nevertheless, given satisfaction and paid its shareholders." [The line is now owned by the corporation, and the fact that it is being abandoned cannot easily be reconciled with Mr. Raworth's statement.] "We have also the Liverpool Overhead, the Isle of Man tramways and the South Staffordshire line as standing proofs of our native ability to deal with problems of the most varied and exacting character. "The total mileage of electrically worked tramways in Great Britain is now 93. The projected lines, however, amount to no less than 340 miles in length, and the capital required for their equipment will certainly not be less than fifteen million dollars." This large amount of prospective business, however, represented only the beginning of the demand. Very soon, he said, horse traction will be superseded by electricity on the whole 1,000 miles of tramway now existing; and in addition to this London will be honey combed with subterranean electric railroads and provincial towns will adopt systems of surface tramways far more elaborate and extensive than those which now exist, even if they have to widen their streets to accommodate them. There is already sufficient indication of what is coming in the attitude of Manchester, Leeds, Sheffield and Glasgow.

The present tendency in the municipalities denotes considerable progress, but if we reckon that of the 340 miles of street tramways projected only about 100 miles will be actually equipped electrically within the next two or three years, we shall be not far wrong. However, Americans have reason for hoping for revolution in this direction. We have been largely responsible for the awakening in England and have already done some good work there which has become the standard for other English lines, and we may expect that a portion of the contracting and equipment work will be still given to American houses. The present fitness and preparedness of American electrical works for this boom will render it difficult for the English manufacturer to compete even on his own ground, either in the matter of price or suitability.

More Steel Cars.

The orders already received by the Schoen Pressed Steel Company are very encouraging as to the future of large capacity steel cars. We have duly recorded the order of the Pittsburgh, Bessemer & Lake Erie for 1,000 cars of 100,000 lbs. capacity, also that of the Pittsburgh, McKeesport & Youghiogheny (Pittsburgh & Lake Erie) for 150 cars of 100,000 lbs. capacity. Additional orders have lately been placed with the company as follows:

Pennsylvania Company, 200 coal and ore cars of 110,000 lbs. capacity.
Pittsburgh & Western, 450 coal and ore cars of 100,000 lbs. capacity.
Pittsburgh & Lake Erie, 100 coal and ore cars of 100,000 lbs. capacity.
Lake Superior & Ishpeming, 40 ore cars of 100,000 lbs. capacity.

All of these cars are self clearing and will be built from the plans of Mr. Charles T. Schoen. Diamond, pressed-steel trucks, made by the Schoen Company, will be used under all of these cars. The cars for the Pennsylvania Company and for the Pittsburgh & Western (Baltimore & Ohio system) are to haul coal and ore between the Lakes and Pittsburgh and will have journals 5½x10 in.; the other cars will have 5 in. by 9 in. journals.

None of these cars will weigh over 34,000 lbs. and those for the Lake Superior & Ishpeming will weigh only about 26,000 lbs. These are 22 ft. long and designed especially for the Lake Superior iron ore trade, the hoppers being arranged to unload into pockets at the docks only 12 ft. apart.

As has been repeatedly stated, the fundamental fact underlying the design of these cars has been to build a steel car as cheap per ton of carrying capacity as a well designed modern wooden car, and Mr. Schoen feels satisfied that he has accomplished this important object and demonstrated that a steel car adapted for hauling given maximum loads can be built as cheaply as a wooden car, per ton of carrying capacity. We give below a statement prepared by Mr. Schoen showing a comparison between wooden cars and steel cars, which is stated first in cost of maintenance, and second in gain due to the saving of dead weight.

Saving in Cost and Maintenance.

Comparison of cost between 30-ton wooden car and 50-ton modern steel car. The comparison includes interest and cost of maintenance for the life of each car respectively. The cost of repairs to the wooden car is averaged at \$40 per year throughout its life of, say,

15 years, and of the steel car at \$20 per year throughout its life of, say, 30 years.

Wooden Cars.		Modern Steel Car.	
Cost, new	\$525.00	Cost, new	\$810.00
Interest, 15 years at 6%	472.50	Interest, 30 years, at 6%	1,458.00
Repairs, \$40 per year, 15 years	600.00	Repairs, \$20 per year, 30 years	600.00
Cost for 15 years	\$1,597.50	Cost of steel car for 30 years	\$2,868.00
Double this amount and you have the cost of wooden car for 30 years	\$3,195.00	This means a cost of \$95.60 per year during the life of the steel car, or \$1.91 per ton carrying capacity.	
This means a cost of \$106.50 per year during the life of the wooden car, or \$3.55 cost per year per ton carrying capacity.			

Difference in cost per year per ton carrying capacity in favor of steel cars, \$1.64, which is equal to 46.2 per cent.

If this \$1.64 be multiplied by 50 tons—capacity of steel car—it shows a saving per steel car per year of \$82
At \$32 per steel car per year, 500 steel cars will save per year 41,000
At \$41,000 saved per year, 500 steel cars for 30 years will show a total saving of 1,230,000

Gain Due to Saving of Dead Weight.

Assuming that train loads of 1,500 tons of paying freight are hauled, and that the wooden car weighs 16½ tons and the steel car 17 tons:

To haul 1,500 tons, 50 wooden cars are required, weighing 825 tons
To haul 1,500 tons, 30 steel cars are required, weighing 510 tons

Dead weight saved per train load, favor of steel cars 315 tons
If 500 steel cars are used, it will give 162-3 full train loads, which, multiplied by 315 (tons of dead weight saved per train), gives 5,250 tons of paying freight gained for each run of the 500 steel cars.

In estimating the actual cost to a railroad company for hauling ore to, and coal from, Pittsburgh to the lakes, many difficulties are met with. We have assumed, however, for the purpose of this comparison, a cost of 15 cents per ton in each class of cars.

5,250 tons of paying freight gained for each run of 500 steel cars at 15c. per ton, equal... \$787.50
If the cars make 30 runs per year this gain is \$23,625.00
30 round trips (equal to 60 runs one way) per year \$23,625.00 × 2, equal... 47,250.00
Gain in 30 years due to saving of dead weight alone, \$47,250.00 × 30, equal 1,417,500.00

Recapitulation.

Saving in cost and maintenance, statement No. 1 \$1,230,000.00
Gain due to saving of dead weight alone, statement No. 2 1,417,500.00
Total saving effected by 500 steel cars in 30 years \$2,647,500.00

The London "Underground" and Electrical Equipment.

One of the most difficult problems in underground railroad construction and management which have confronted English railroad officers and engineers for the past five and twenty years has been and is how to efficiently ventilate the tunnels of the Metropolitan steam line. In 1897 Parliament appointed a special committee to inquire into the matter. There were many sittings, and experts gave evidence in detail which brought out certain facts which influenced the commission in favor of electric traction. The conclusions ultimately arrived at will have a good deal to do with the next step to be taken, and it is therefore as well to state them in some detail in order that American engineers, who will, for obvious reasons, doubtless have much to do with the conversion when carried out, may be aided in their deliberations. It has been hinted that the British public will be averse to the line being altered by American engineers using American plant, but the general feeling about this Metropolitan line is that, come who will, and come what may, the line must be electrically equipped, whether American, German or English engineers carry the scheme into effect.

The conclusions of the commission* are, briefly:

- (1) That by far the most satisfactory mode of dealing with the ventilation of the Metropolitan tunnels would be by the adoption of electric traction.
- (2) That it would be practicable to ventilate the tunnels by means of fans, but that the cost would be considerable.
- (3) That, failing this, the ventilation, especially at stations, would be sensibly improved by the provision of openings, but that it could not be rendered satisfactory unless by a large increase in the number of openings proposed by the company, and a consequent large addition to the expense.
- (4) That, in view of the probable adoption of electric traction in the near future, it can hardly be expected that the company should incur the heavy expense of at once providing artificial ventilation, and that, if they did, it would probably defer the more satisfactory solution of the question.
- (5) Therefore, as a temporary measure, the committee are prepared to recommend that the construction of the proposed additional openings, which would be found useful even when the line is worked electrically, should be allowed, but only upon the condition that, unless electric traction be adopted, or some satisfactory artificial ventilation be introduced within three years after the passing of the act authorizing these openings, it shall be made incumbent upon the company to close them if called upon to do so by some competent authority, to be named by Parliament.

The chief expert witnesses examined stated that

*The commission was composed of such eminent men as Major F. A. Marindin, R. E., M. G.; Earl Russell (a prominent electrical man); Sir Douglas Galton, K. C. B.; Sir Charles Scott, and Dr. J. Scott Haldane, and the report issued by it to the Houses of Parliament has been issued in the form of a Blue Book.

economy and efficiency, as well as purity of air, would result from working by electricity. This opinion is endorsed by the company's own officials, and it is significant that the chairman of the company himself says that "the moment we can get a reliable firm or combination to undertake the working of the inner circle by electricity we shall accept it."

A more recent statement by that gentleman (to the shareholders, on January 28, 1898), is that they would consider the use of electrical locomotives firstly and chiefly for the use of passenger traffic. "He should like to see the inner circle used in that way as an experiment. It was to do that they were asking Parliamentary powers. The directors for years had had the subject in mind. They thought they were now on the way to secure it, but there were great difficulties in the way. Electricity was undoubtedly the solution of the ventilation question. They would, of course, require entirely new rolling stock. There was no difficulty about pulling trains of 200, 250 or 300 tons. The question to be solved was having a sufficient reserve of energy on the circle in the event of two, three, four or more trains wanting to start at the same time for them to do so. That was the problem exciting the minds of electricians."

General Characteristics.

One of the principal causes of the present ventilation difficulty is the fact that when the line was built it was intended to work the traffic with hot-water locomotives. When, however, experiments were made with locomotives of that type, just previous to the completion of the line, this method proved a failure and the idea had to be abandoned. In the long run ordinary locomotives fitted with condensers were adopted. Coke was used as fuel at first, but coal was afterward resorted to and is now used. Openings in the tunnels, the employment of fans, etc., have been tried, but they have failed to be effective. There are two fans working at present at Whitechapel Road and Eastcheap.

Mr. W. H. Gates, A. M. I. C. E., presented to the commission some general details, such as the weight of the trains, weight of engines and general data, and we select the most interesting and useful. Over one length of the line, Edgware Road to Bishopsgate, there are three companies' engines working, i. e., the Great Western, the District and the Metropolitan. The District engines run all round the "circle" on one track, and the Metropolitan run all round on another track. There are 103 Metropolitan circle trains with Metropolitan engines and 99 District circle trains with District engines.

The general history of the company's negotiations in regard to electrical equipment was stated before the commission by Mr. Bell, the chairman. They have been for ten years in actual negotiation with no less than six different syndicates or inventors of standing, each of whom professed ability to work the traffic successfully by electricity. Unfortunately they found the difficulties to be overcome were greater than they had supposed, and they ultimately withdrew their proposals. But there have been such enormous improvements in electric traction that the inventors are, in Mr. Bell's opinion, within very measurable distance of overcoming the difficulties encountered in devising a means of adapting it to the Metropolitan. In fact, only a few months since the company had a proposal which seemed to point to the solution of the difficulty, but there was one point upon which they were not quite satisfied, and that was under consideration.

The working of the Liverpool Overhead Electric Railway was referred to by Mr. Francis Fox, C. E. It will be remembered that the Liverpool line has about a half a mile of tunnel through which its electric cars run. The electrical working of the Liverpool line is continued through the half-mile tunnel, with the result that the air is pure and fresh. Although the electricity would have to be conveyed from a central station, it would not mean that all the trains must work electrically, for steam locomotives could run over the line, although the electrical conductor was there. He thought that on railroads where there are frequent trains electrical working would prove economical and pleasant. The trains on the Liverpool line seat 160 passengers, and the cost of hauling, that is, locomotive expenditure, is 3.68 pence per mile. That 3.68d. includes all expenses connected with "outcome" under the locomotive heading, and compared with about 6d. or 6½d. on ordinary railroads, and about 11d. on the Metropolitan. The carrying capacity of the Liverpool overhead trains is 160 passengers, but on the underground it is 415. The trains on the Liverpool overhead run every three or four minutes; some of the trains have three, others two coaches, the two end ones being motor cars. The Liverpool electric trains sometimes run at 30 miles an hour, but the average from end to end is only 12½ miles an hour.

Mr. Fox would recommend that the center rail conductor be used. The proper thing would be to have motor trains for "circle" work only, electrical locomotives for trains coming on to the circle and to use the present engines and carriages on the outlying branches. Mr. Fox estimates that an electric

railroad on the Metropolitan and District circle, a length of 13 miles, on which there are at present seven trains running each way at intervals of 10 minutes, could be established, complete, taking credit for the existing stock at about an average of, say, 40 per cent on their original value, for about \$1,760,000, and a seven-minute service could be given instead of a 10-minute. The amount of current required on the conductors to deal with the large volume of traffic, say, at Kings Cross, would be much heavier than anything in use on the City and South London electric line.

It was stated by another witness that the City and

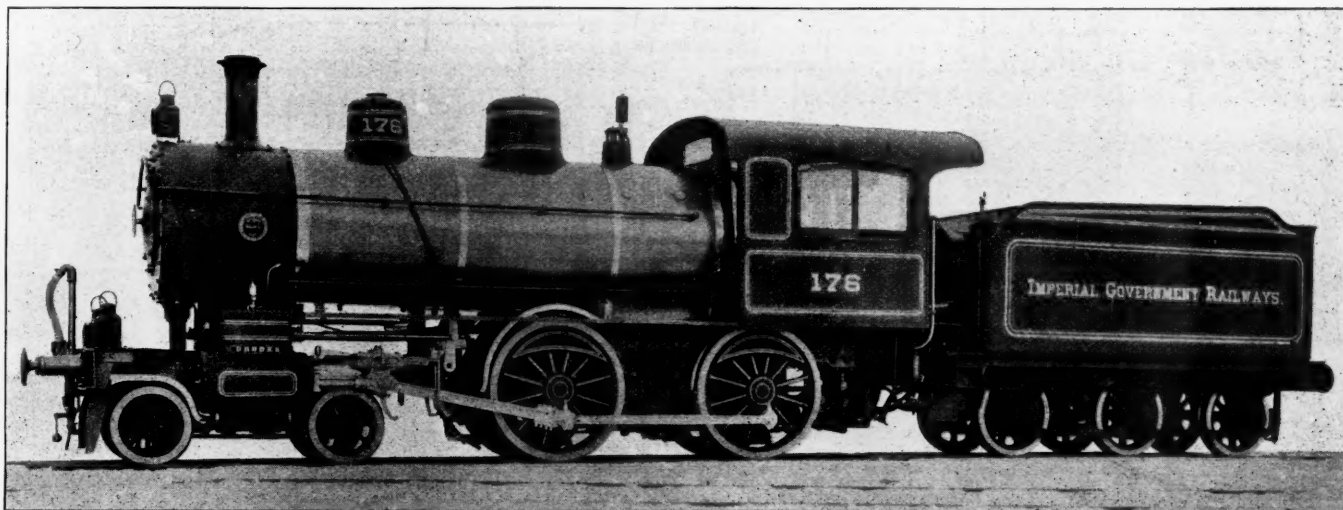
came, but they must leave a reasonable time for everybody, sceptics included, to satisfy themselves that it is practicable. He had got all the details of the proposal, and had advised upon them, but they had to wait until they could get further measurements and data. He believed the Metropolitan could with great advantage be worked by electric power. The steam engines of other lines could be changed at the outlying stations.

The company has a bill before Parliament under which powers are sought to work by electricity the traffic on all or any of their existing lines, and by agreement the joint lines of the Metropolitan and

The line from Baker street to Finchley road rises continually to within 176 yards of Finchley Road station. It consists of a succession of tunnels between an open cutting adjoining Baker street, and that south of St. John's Wood station, and between the stations of St. John's Wood, Swiss Cottage and Finchley Road. But these tunnels present somewhat different conditions from the tunnels on the main line.

Brooks Locomotives for Japan.

The Brooks Locomotive Works, during January, completed the shipment of 20 eight-wheel loco-



Brooks Eight-Wheel Locomotive for the Imperial Government Railroads of Japan.

South London line has practically no ventilation and the air is very stagnant.

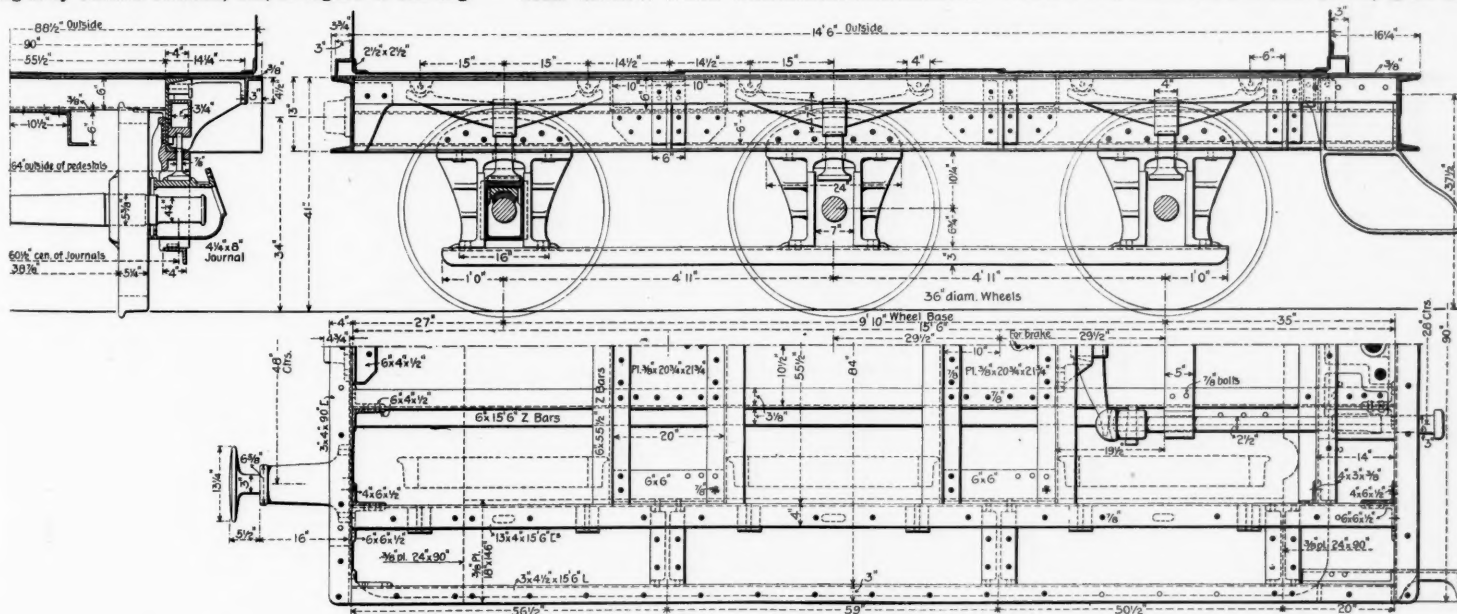
Sir A. R. Binnie, the engineer to the London County Council, thought there would be little difficulty in employing electric traction on the line, but it was surrounded with other difficulties, owing to the inflow of traffic from the outer districts. In that direction he thought it was almost impracticable at the moment, because it would involve change of engines at Baker street. Mr. Binnie considered that if electrical traction could be assured, the London public could bear for a year or two the existing evil—if it could be assured that the whole of the inner circle was going to be worked by electricity. There was no practical difficulty in moving trains of the existing weight by electric traction, but, in regard to starting

Metropolitan District companies; also to erect and equip the necessary power stations for the purpose.

Details of Metropolitan Trains. (W. H. Gates.)		
	Tons.	Cwt.
Weight of locomotive.....	46	12
Weight of train	90	0
Total	136	12
H. P. developed at 25 miles per hour on the level—25 per cent. cut off.....		
Time taken to attain speed of 15 miles per hour on the level.....	30	seconds
Fuel and Water Consumed, Also Trains Run, on the Metropolitan. (W. H. Gates.)		
Coal—Amount used per locomotive per hour....	3	cwt.
Water—Amount used per locomotive per hour....	330	gal.
Between South Kensington and Praed Street Junctions—		
Number of trains per hour.....	Up	6
Number of trains per hour.....	Down	6
Total	12	

tives for the Imperial Government railroads of Japan. All the recent locomotives for Japanese railroads resemble more nearly the standard types of American practice than did the first ones built in this country; this feature is well brought out by the accompanying engravings, made from a photograph and the general drawings of one of last lot of engines built by Brooks.

The engine illustrated is for use on roads having a gauge of 3 ft. 6 in. It has a total weight of 74,500 lbs., and a weight of 50,400 lbs. on the driving wheels. Japanese bituminous coal is to be used. The cylinders are 15 in. in diameter by 22 in. in stroke, and the driving wheels are 54 in. in diameter. The boiler is of the straight barrel type, 54 in. in diameter at the forward end, constructed of steel plates, 1/2 in. thick,



Frame of a Six-Wheel Tender for the Imperial Government Railroads of Japan.

them, of course, they would not be worked so economically on the flat gradients of the Metropolitan, as they are proposed to be worked on the underground electric railroads which are to be constructed in London on the switchboard principle. There would be a larger amount of electrical power required in starting than is contemplated on the other lines referred to. The chief difficulty, to his mind, was the traffic coming in from outside, and this only happened at Praed street junction. He was of opinion that if 12 trains an hour were electrically drawn, and the others as at present by steam, the improvement would be reasonably satisfactory, on account of the lesser quantity of smoke, etc., emitted from the engines.

Sir Benjamin Baker, K. C. M. G., said he had had before him for some months a proposal to work the inner circle by electricity. There was not the slightest doubt it would be done when the proper time

Between Praed Street Junction and Aldgate—		
Number of trains per hour (9 to 10 a. m.).....	Up	19
Number of trains per hour (9 to 10 a. m.).....	Down	19
Total		38
Number of trains per hour (2 to 3 p. m.).....	Up	18
Number of trains per hour (2 to 3 p. m.).....	Down	17
Total (Saturday only)		35
Number of trains per hour (2 to 3 p. m.).....	Up	15
Number of trains per hour (2 to 3 p. m.).....	Down	14
Total (only week days)		29

The above includes Metropolitan, District and Great Western trains.

The average carrying capacity of trains running on inner and outer circles is 426.66 passengers. The average number of passengers actually conveyed per train, 160.42.

For the trains passing Praed street, the average carrying capacity is 416.12 per train, and the average actually carried 140.36.

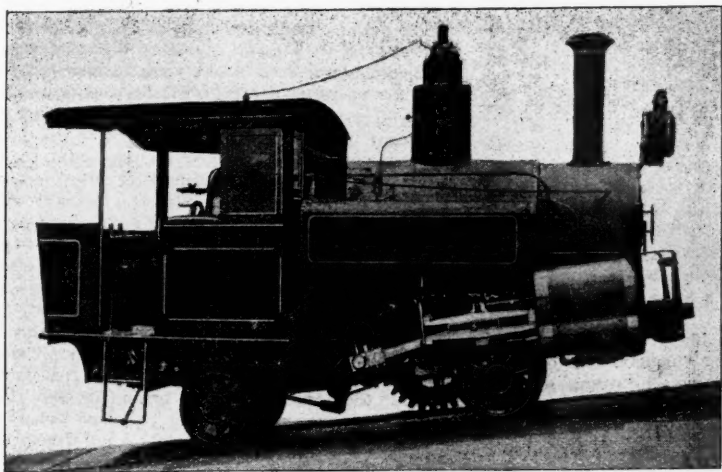
to carry a working steam pressure of 160 lbs. per sq. in. The firebox is of copper fitted with a brick arch and the tubes, 1 1/4 in. in diameter, are of solid driven brass. The crown sheet is supported by radial stays.

There are 89.9 sq. ft. of heating surface in the firebox, 965 sq. ft. in the tubes, thus making a total heating surface of 1,054.9 sq. ft.; the grate area is 15.2 sq. ft. The springhanger arrangement shown is now being generally used on American engines. The floor in the cab is on a level with the running board, while the tender floor is raised 10 in. above that in the cab; the cab is constructed of steel. The boiler check is inside the cab on the top of the boiler and the feed-pipe is run inside the boiler and delivers the feed water at about the usual point in the forward end. The Laird type of crosshead is used. The engine is provided with three headlights having 8 in. semaphore lenses.

Rack Rail Locomotive for Brazil.

The accompanying engraving shows a rack rail locomotive, two of which are now being built at the Baldwin Works, for the Leopoldina Railway Co., of Brazil. In 1890 this road was consolidated with others under the name of "Companhia General de Estradas de Ferro no Brazil," comprising in all 1,344 miles. The engines are of the following general dimensions:

Gage.....	3 ft. 3 3/4 in.
Cylinder.....	13 x 20 in.
Drivers (pitch line).....	41.35 in.
Total wheelbase.....	53.0 ft.
Weight about.....	53,000 lbs.
Boiler diameter.....	44 in.
Number of tubes.....	132
Diameter of tubes.....	1 3/4 in.



Rack Rail Locomotive for the Leopoldina Railway.

Length of tubes.....	7 ft. 10 1/4 in.
Firebox.....	60 1/2 in.
Depth ".....	36 in.
Width ".....	42 1/2 in. front; 38 1/2 in. back
8 spring.....	27 1/2 in. Radial
Diameter of carrying wheels.....	27 1/2 in.
Length ".....	6 in.
Rack wheel centers.....	31 1/2 in.
Axle journals.....	6 1/2 x 7 in.
Tank capacity.....	700 gals.

Joining Rails of Different Sections.

What follows is the substance of a recent letter from Mr. Sandberg to "Engineering."

"Since the introduction of heavier rails there is room for a special manufacture of step-fishplates. Fig. 1 shows cast-steel step fishplates, angular section, joining a 68-lb. with my new 80-lb. flange rail on the Swedish State Line. The weight is about 56 lbs. per pair, and at \$24 per ton would make 12s. per joint. This plan has been used on the Swedish State Railroads for many years and has given satisfaction.

"Fig. 2, cast steel rail junction, shows a method designed by Mr. C. W. Kinder, Engineer-in-Chief for the Imperial Chinese Railroads, for joining my old 60-lb. with my new 85-lb. rail, the ordinary fishplates for each

diversified nature of that country, as well as to the many kinds of traffic, it is perhaps not surprising to find so many types of locomotives in use as were shown at Budapest. The majority of these were compounds, many on the Woolff system, and usually inside-connected. While there was nothing very new in the design or construction of these locomotives, yet it is interesting to observe the great variety of types used.

The express locomotives were mainly of the eight-wheel American type, and there was one 10-wheeler for pulling fast trains on heavy grades in the mountainous districts of Hungary, that was almost exactly like those in use in this country. For local trains and mixed traffic there were several designs shown. There

were the four-wheel connected tank engine with a four-wheel truck, the same with a two-wheel truck, and another variety with a two-wheel truck under each end. Then there was another with four wheels connected, and a leading axle rigidly fastened to the frame and still another having six wheels connected and a two-wheel truck under the extension of the rear end of the frames, on which the coal bin was carried.

The freight engines were of two well-defined types, namely, six wheels connected and eight wheels connected, with the entire weight carried on the driving wheels. In general size, heating surface and tractive power these engines are about equal to the 10-wheelers and consolidations that were standards in this country about 10 or 12 years ago. As is usual in Europe the boilers of the locomotives exhibited were of the radial stay, straight-top form, with the firebox between the frames, and the dome placed on the smokebox end of the shell. The Heusinger valve gear was used chiefly, though one or two engines were equipped with a modification of the Stephenson link motion. It was noticeable also, that inside cylinders and crank axles are still preferred to outside connections in Europe.

These expositions are frequently held in the different countries of Europe; in fact, there is at least one every year, and the state railroads as well as the private manufacturing establishments are always well represented by the products of their mills and workshops.

The Joughins Steel Trucks.

The accompanying engravings show two styles of steel trucks designed by Mr. G. R. Joughins, Superintendent of Motive Power of the Norfolk & Southern, the principal object of the design being to use commercial rolled beams for the side frames and transoms, either of I or channel sections.

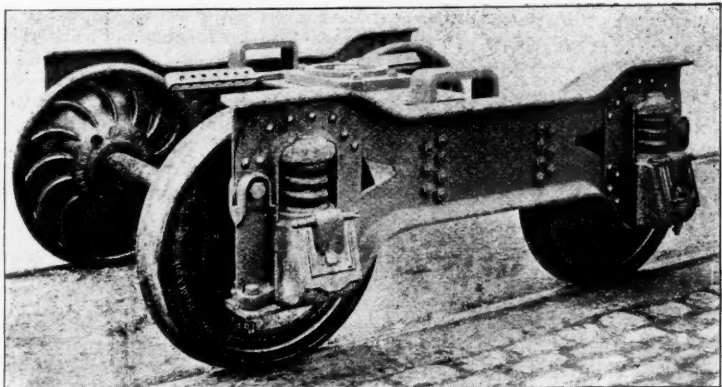


Fig. 1.—Joughins Steel Truck.

section being used to make the connection. It is about 27 in. long and weighs 56 lbs., and costs about the same as the fishplates in Fig. 1.

"There is, however, the liability to unsoundness in casting with both these methods, and weakness through the steel not being worked, besides the contact surfaces cannot be as smooth as if they had been rolled or planed. Fig. 3 shows an 86-lb. bullhead rail joined with a 100 lb. by plain, rolled step-fishplates, which weigh only 34 lbs. per pair. These can be made from a bar rolled to the larger section and planed, or still better by forging in a die under a steam hammer or press.

"Such a plain fishplate could also be used instead of angular fishplates for connecting two flange rail sections, as the creeping of the road, which is prevented by the spikes in an angular fish, would not be much affected by the omission of the spikes in one joint only."

Locomotives at the Budapest Exposition.

At the Exposition held in Budapest in 1896 a large number of locomotives was shown of the types in use on the state railroads of Hungary. Owing to the

with the pedestals and the pedestal castings are in turn riveted to the side frame; the lower flange and web of the side frame is cut away to fit the pedestals. The transoms are two parallel I beams joined to the side frames, the webs by means of angles and the flanges by an upper gusset plate, rivets being used for these connections.

As shown, the pedestals of both trucks are arranged so that the wheels and axles may be removed by raising the car sufficiently to take the weight off of the springs; this can be accomplished more easily with the arrangement shown in Fig. 2. In reference to the importance of constructing metal trucks so as to be able to quickly remove the wheels and axles, Mr. Joughins writes us as follows: "It seems that if the flanged beam truck is to make its way and come into universal use, the arrangement for removing the wheels and axles without raising



FIG. 1. CAST STEEL STEP FISHPLATE



FIG. 2. CAST STEEL RAIL JUNCTION



FIG. 3. FORCED STEEL STEP FISHPLATE

the car is a vital and essential part of its design. The objections to jacking up a freight car the whole length of the pedestal are very great in our repair yards, and at large interchange points, where numbers of wheels are replaced daily, the objection is almost insuperable, the car repairer condemning any form of truck which makes the operation necessary."

In view of the small number of metal trucks so far presented which have been designed with a view to readily removing the axles and wheels, it might appear that sufficient attention has not been given to the point raised by Mr. Joughins.

Nickel Steel for Crank Pins and Axles.

By H. F. J. Porter, M. E.*

It hardly seems necessary to explain to an engineer why, if he wants material to sustain severe usage in the nature of alternating stresses, he should select a material possessing a very high elastic limit. And yet it is not unusual to find engineers—particularly railroad engineers—who prefer to use wrought iron for their locomotive crank and cross-head pins and axles in preference to steel, because, as they say, "steel being crystalline is brittle and snaps off suddenly under such service as that under consideration; while iron, having fibre, is tougher and yields before breaking." Most of these men know better. They all know that the fibre in wrought iron is due

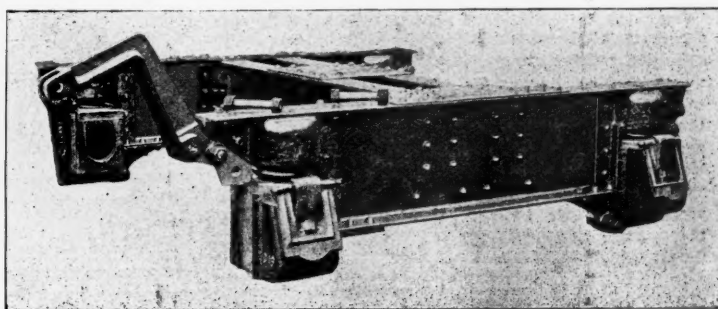


Fig. 2.—Joughins Steel Truck.

Fig. 1 shows the first style of truck, several of which were built by the Baldwin Locomotive Works for the Norfolk & Southern during the past two years. These trucks have been in hard service under locomotive tenders, and we are told that so far there have been no signs of failure in any of the parts. It will be noticed that a portion of the web near the ends of the I beam, which forms the side frame, is cut out and the ends are spread to make room for the journal box and springs between the flanges. The pedestals are of cast steel or malleable iron as desired, riveted to the side frames. The transom consists of two I beams placed side by side, which are joined to the side frames by means of angles bolted to the webs; no holes are drilled through the flanges for these connections.

Any objection which might be raised to cutting and shaping the I beams, as in Fig. 1 (although the construction may be without objection) is overcome in the later style of truck shown by Fig. 2. In this truck the side frame is a plain I beam the same depth throughout. The upper spring seats are cast

to the slag which could not be eliminated from it in manufacture. It is a common laboratory experiment to pass chlorine gas through a glass tube containing a piece of wrought iron. The iron is dissolved out, leaving a skeleton of slag of the same shape as the piece of iron. Here and there in the interior of the skeleton can be seen accretions of slag which, imbedded in the original piece of wrought iron would weaken it appreciably. Instead, therefore, of being an element of strength, the fibre is evidence of an impurity which is a source of weakness.

We hear of many forgings having failed in the past from a mysterious so-called "crystallization from shock" or "vibration" in service. We all ought to know that metals crystallize only in cooling from a fluid to a solid state, and that any unusual crystallization shown in a fractured forging was there when the forging was made, and was due to improper heat treatment during manufacture.

There is still much to be learned about steel, but

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there is no longer any mystery about the breaks that occur in its use. If the elasticity of the metal exceeds by a large factor of safety the external stress applied, the life of the material will be long. In other words, the stronger the material the longer it will last under any given service. The cause of the final failure to longer endure the stresses applied is the gradual overcoming of the internal molecular force of cohesion. To this gradual weakening of the metal has been given the name "fatigue." The endurance of metal to resist fatigue has been carefully studied and much valuable information on the subject has been collected.

As far back as in 1871 experiments were reported by Woehler in Germany, followed by Spangenberg and Martens and Bauschinger. In England the subject was similarly reported upon by Mr. (now Sir) Benj. Baker, and it has since been pursued systematically in this country by Mr. James E. Howard at the Government Testing Bureau at Watertown, and others. And after all the time and labor that has been devoted to the investigation, what information has been derived? Simply this, that iron and steel are more amenable to the known laws of the universe than we had previously given them credit for being; that the same laws of nature under which "continuous droppings will wear away a stone" are applicable to these metals. Repetitions of load in amount below the ultimate strength of the material will eventually break down its resistance and cause failure. Beyond this statement laws of a general character have been formulated, but the complex nature of the situation prohibits exactness. In "endurance tests" of this character, Woehler found that the rupture of a bar of wrought iron by tension was caused by any of the following ways:

By 1 application of 55,000 lbs. per sq. in.
By 800 applications of 51,500 lbs. per sq. in.
By 107,000 applications of 47,000 lbs. per sq. in.
By 341,000 applications of 42,500 lbs. per sq. in.
By 481,000 applications of 38,000 lbs. per sq. in.

A piece of spring steel, subjected to bending, broke as follows:

Under 81,000 applications of 95,000 lbs. per sq. in.
Under 154,000 applications of 85,000 lbs. per sq. in.
Under 210,000 applications of 75,000 lbs. per sq. in.
Under 472,000 applications of 65,000 lbs. per sq. in.
Under 539,000 applications of 58,000 lbs. per sq. in.
Under 1,165,000 applications of 53,000 lbs. per sq. in.

No two pieces of metal are alike in chemical composition, and if they closely approach similarity in this respect, we now know that the difference in mechanical treatment during their manufacture may cause them to possess widely different physical properties. Speaking generally, however, regarding iron and steel, we know that for any given stress a certain number of repetitions produces failure, the greater the intensity of stress the smaller the number of repetitions. We know also that the stress required to cause failure is less and roughly speaking only one-half as great when the metal is strained alternately in opposite directions, as in crank-pins, axles, etc., as where it is strained in one direction only, as in eye-bars of bridges.

Let us submit a bar of steel or iron to 30,000 lbs. per sq. in. tensile, or to 30,000 lbs. per sq. in. compressive stress. In either case the "range" is the same, viz.: 30,000 lbs. Now let us subject the bar to 15,000 lbs. per sq. in. tensile and to 15,000 lbs. per sq. in. compressive stresses alternately, and although the range is 30,000 lbs. as before, the life of the material thus strained will be only half as long, although neither the tensile nor compressive stress approaches the elastic limit of the metal as closely as in the first two cases. In other words, the more the metal is maltreated, the shorter the time it will endure. But if we can make the "range" of stress low enough, a practically unlimited number of repetitions is required to cause failure. It is in fact very striking how regularly progressive the increase in the number of repetitions is as the range of stress decreases.

In the apparatus used to make endurance tests of this character conditions are imposed on the metal, imitating those which occur in actual practice, in such machine parts as railroad axles, engine shafts, crank pins, etc., where the fibres of the metal are subjected to stresses, continually varying from tension to compression.

It has been found that within a certain limit, which is approximately one-half of the ultimate strength, the metal is elastic; and that if strained beyond this point its working strength is exceeded and it can no longer be depended upon to sustain even minor loads. Such tests give results, however, which are simply relative. Their actual significance is uncertain. The fact that a metal possesses a certain elastic limit, elongation and contraction of area when ruptured by once loading, fails to convey an adequate idea of what the same metal will do under circumstances of repeated stresses, or when these stresses are applied in alternate directions, as they are in practice. These "endurance tests," therefore, have been made in connection with the usual standard tests to determine the relations that exist between the two. From a careful comparison of these relations, knowledge is obtained so that through a determination of the qualities of metal by the cheap and rapid standard tests a prediction can be made of the conduct and endurance of the same metal in

an actual service, analogous to that in the endurance test, which is a long and expensive one, and therefore, impracticable for use in commercial work.

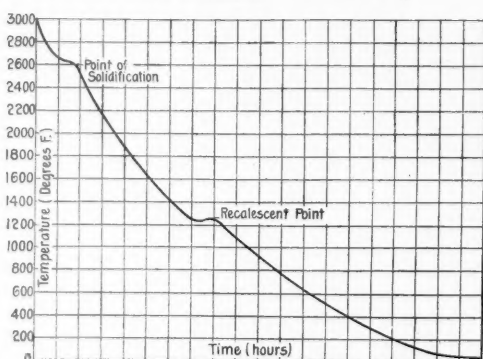
Following are the results of tests on bars broken from time to time during the past few years at the Watertown Arsenal. The records of the wrought iron bars are the average of a large number of tests.

Fibre stress, lbs. per sq. in....	40,000	35,000	30,000
Rev's.	Rev's.	Rev's.	Rev's.
Wrought iron breaks after.....	59,000	175,000	625,000
.15% carbon steel breaks after.....	170,000	765,000	.....
.25% carbon steel breaks after.....	229,000	.....	.....
.35% carbon steel breaks after.....	317,000	5,100,000	.....
.45% carbon steel breaks after.....	976,000	.....	.....
.55% carbon steel breaks after.....	.....	9,600,000	.....
.65% carbon steel breaks after.....	.....	.....	.....
.75% carbon steel breaks after.....	.....	15,000,000	12,550,000
.85% carbon steel breaks after.....	.....	19,000,000	16,300,000
.95% carbon steel breaks after.....	.....	.....	.....
105% carbon steel breaks after.....	.....	.....	50,000,000 (Not ruptured.)
3 1/4% nickel steel, carbon .25% to .30%.....	1,850,000	.....	.....
4 1/4% nickel steel, carbon .25% to .30%.....	2,360,000	.....	.....
5 1/4% nickel steel, carbon .25% to .30%.....	4,370,000	.....	.....

These results, which are representative of many, show that the material, after a certain number of repetitions of stress within the elastic limit breaks with a fewer subsequent repetitions. It is impossible not to conclude, whatever the cause of decreased life of the bar may be, it is a cause which acts continuously, altering in some way its structure or properties.

It would naturally appear likely that any gradual progressive alteration or "fatigue" of the bar would be manifested in some way in alteration of the ultimate strength, elastic limit or elongation of the metal, when tested in the ordinary way. This, however, does not appear to be the case. Careful consideration of the results of endurance tests so far made, leads to the recommendation of material for forgings, if they are to be subjected to frequently alternating stresses, which shall have a very high elastic limit and that they shall be so proportioned that these stresses shall at all times lie far within this limit. Steel, not wrought iron, should be the metal used, and the higher the carbon content of the metal the higher will be this limit, and the longer will be the life of the piece. A low percentage of nickel in its composition will increase its life still further.

High-grade steel forgings, sound and free from internal strains, are by no means easy to produce. Complete chemical and physical laboratories should be an adjunct of every forge that expects to do conscientious work. The forge should possess its own steel plant and cast its own metal. The chemical composition of the metal from which the forging is to be made should be carefully considered and specified, and tests from the ingot metal should show that what was specified has been obtained. Records should be kept of the treatment of each forging as it progresses from each successive stage to another. The ingot should be cooled from its fluid state until it is solid under sufficient pressure to expel air and gases. The reheating of the ingot for forging should be carefully supervised to prevent the surface metal expanding away from the center and forming cracks from too rapid heating. The forging process should be conducted under a slow-working hydraulic press, instead of a hammer, in order to ensure thorough flowing of the metal. After the forging process is completed, subsequent heat treatment must follow to relieve the metal of forging and cooling strains. Let us consider the "rationale" of this heat treatment a little more at length.



Cooling Curve of Steel.
H. F. J. Porter.

If we note the rate of cooling of a steel ingot from the point of solidification to coldness, we will see that the temperature will fall regularly the same amount in equal divisions of time until between 1,300 and 1,200 degrees Fahrenheit a point (depending on the carbon content) is reached where the temperature suddenly stops falling and for a time either remains stationary or perhaps rises for a short time, and then the rate of cooling continues regularly. This point, where the change of rate takes place, is called the "recalescent" point, and from chemical and physical tests we know that a change in the structure of the steel occurs here.

The fluid steel begins to crystallize at the point of solidification and the slower the rate of cooling from there down the larger the crystals will be when the ingot is cold. At the point of recalescence, however, it would seem as if the crystallization, so to say, locks itself, for after the ingot has become cold, if we reheat it to a temperature below this point, on again becoming cold we will find that the crystallization is not affected, but if we reheat it a little above the recalescent point, when it is again cold the crystallization will be found to be much smaller than before.

In fact it is known that if steel is heated slightly above the recalescent point, all previous crystallization is destroyed and a fine amorphous condition is produced at that temperature. As soon as cooling begins again, crystallization sets in and continues until the ingot is cold. As, however, the time of cooling from the recalescent point is comparatively short the resultant crystallization is correspondingly small. It can be readily understood that when heat treatment can completely change the internal condition of steel, it should bear an important part in the manufacture of forgings made of that metal.

Let me for a moment consider the changes which take place in the condition of the metal as it passes through the forging process. Beginning with the cold ingot (which we will assume has cooled slowly and is therefore composed of large crystals), we first reheat it up to a forging temperature of from 1,800 to 2,000 degrees Fahrenheit, thus passing through the recalescent point, destroying all crystallization and producing an amorphous condition. As we put it under the forging press it begins to cool, crystallization at once setting in; at the same time, however, we begin to work the metal.

The work of forging tends to check crystallization, just as disturbing water which is below freezing point will delay the formation of ice crystals. The work of forging may or may not continue (depending upon the size and shape of the finished piece) until the temperature has fallen below the recalescent point, but during this time more or less crystallization has occurred and has been disturbed and distorted. The work of forging has, moreover, proceeded from one end of the piece to the other, the part last worked upon having crystallized considerably before work was applied to it, so that the two ends may be entirely different as far as their internal condition is concerned.

If, as is generally the case, the forging is now considered finished, it is full of pulls and strains about which we know nothing except that they may amount to several thousand pounds to the square inch. The extent of these strains is made evident when a forging, finished as above described, has a cut taken from it in a lathe or has a keyway cut on one side. The strains in the fibres which are cut are relieved, and the piece invariably springs out of "true." To relieve these strains the forging should be carefully and slowly heated to a temperature slightly above the recalescent point and then allowed to cool slowly. By this treatment, which is called "annealing," an entirely new crystallization is established, leaving the molecules of the metal completely at rest. If the forging, on being heated slightly above the recalescent point, is suddenly dropped into a bath of cold oil no time is allowed during the cooling process for crystals to form, and the amorphous condition of its structure at that temperature is retained. This character of heat treatment is called "oil tempering," and is followed by further heat treatment to relieve the metal of any hardening effect due to the cooling process.

In sudden cooling the surface metal of solid forgings is apt to shrink on to the metal of the interior to such an extent as to crack it open. In order, therefore, to oil-temper a forging with safety it should be hollow to allow the heat to be extracted from the interior and surface metal equally.

Annealing lowers the ultimate strength and elastic limit of steel, but increases its ductility, as shown by the elongation and contraction in test specimens. Oil-tempering not only restores the ultimate strength and elastic limit, but increases the elongation and contraction very considerably.

We have seen by the endurance tests above tabulated that even the very best steel suitable for forgings will not last indefinitely under a fibre stress of 40,000 lbs. per sq. in., and that the life of wrought iron and mild steel under even lower stresses is comparatively short. It is not surprising, from the light shed upon the subject by these tests, that the mortality of forgings as usually made for crank pins, axles, etc., is very great. These parts are generally made of material which has initially little strength to resist fatigue. They are loaded up during the process of forging by stresses which may closely approach the elastic limit before any stress whatever is put upon them from outside.

When it is remembered that, besides these stresses a severe compressive stress, sometimes itself approaching the elastic limit, is applied to the metal by the process of forcing them into wheels, it is not surprising that their life is short at the point where the stress is applied.

For such service as is required of crank and cross-

head pins, axles, piston and connecting rods and all forgings subjected to stresses alternating from tension to compression a metal possessing the very highest elastic limit possible should be supplied. We must be sure that our forgings are free from internal strains, so that they will be subjected in service to only those stresses which we know about and have calculated will be applied to them externally. We must also so proportion them that these stresses will be well below the elastic limit of the metal if we desire to insure lasting qualities, remembering that "range" of stress, when the stresses are alternating, has a double value.

In order to obtain the quality of metal most desirable for the service under consideration where a combination of high elastic strength and ductility is of the first importance, steel makers have done much experimenting to determine the effect of varying composition, including the introduction of such

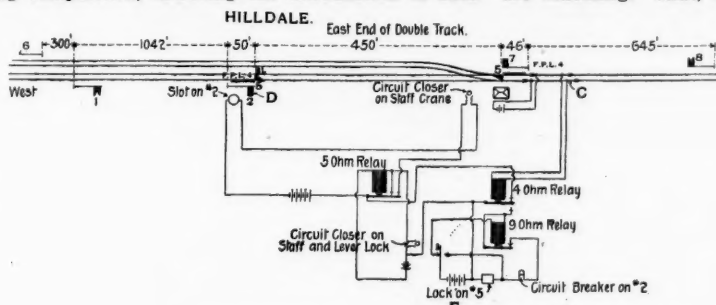
ing the divisions large and the numerals which register low and high pressures are subordinated, but they still appear on the dial in case they should be needed.

To accomplish this the hands make more than one complete revolution, and in fact two revolutions can be made. The stop-pin is inside of the gage, and only stops the hands at 0. Both hands start at 0 in the outer circle and continue around together until 70 is reached. Then the train line pointer stops and the main reservoir pointer goes on around to 90, the standard reservoir pressure, but will go higher if more pressure is carried. In the engraving the two pointers stand at right angles, and as the divisions between the numerals are nearly four times as large as those on the ordinary gage, any variation from the pressures will be noticed more easily.

It may be objected that the two sets of numerals are confusing. That, for example, the engineman

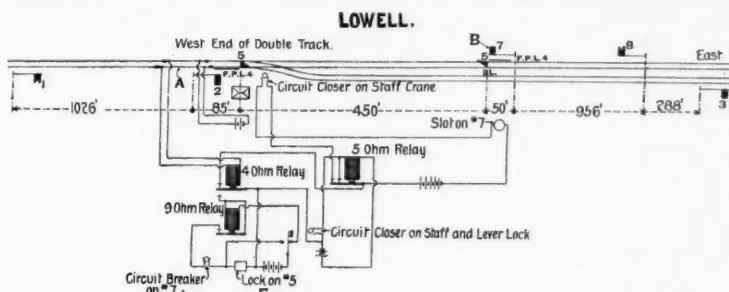
east and Hilldale on the west. This tunnel is 6,500 feet long, and only wide enough for a single track, and an absolute block system has been established between Lowell and Hilldale, 4.2 miles. The electric train staff is used, with electric locking and electric slots as auxiliaries.

The location of all signals, derails and electric circuits are illustrated in the engraving. The home signals, admitting trains to the tunnel, are fitted with an electric slot, and the derail levers are fitted with electric and staff locks. There is a train staff pillar in each tower and a staff crane in front of each tower. In the normal position of the machine and train staffs, that is, all staffs being in the staff pillar, the home signals are kept at danger, and reversing of the lever will not clear them. It is necessary to complete the circuit and energize the magnets of the electric slot on the home signal in order that the operator may clear it. This cannot be done until a



Electrically Interlocked Block Signals for the Single Track Line through the Tunnel at Hilldale, W. Va.—Chesapeake & Ohio Railway.

References.—A.—The track circuit at Lowell controls the electric lock F on lever 5 and the electric slot on signal No. 7. This slot (at B) is controlled also by the staff and the staff crane, and the electric lock (F) is controlled also by signal lever No. 7.
C.—The track circuit at Hilldale controls the electric lock E and the slot on signal No. 2. Electric lock E is controlled also by signal lever No. 2.



unusual elements as chromium, nickel, tungsten, etc.
Nickel Steel.

The first practical application of the improvement in the quality of steel by the use of nickel was in the production of open-hearth armor plate. This alloy increased the toughness of steel of a given hardness or tensile strength so as to add greatly to its resistance to cracking from the shock of projectile impact. An examination of the physical characteristics of this metal shows it to possess valuable qualities which explain its toughness and resistance to shock. The nickel, replacing part of the carbon with a given tensile strength, increases the elongation, and to a greater degree the contraction of area in test pieces at the point of fracture.

Its effect upon the elastic limit, however, is of the greatest importance, as it raises this quality in a marked degree relatively to the tensile strength, and thus insures a combination of elastic strength and ductility unknown in any other metal.

The presence of the nickel also renders the steel sensitive to the good effects of tempering, and the desirable qualities above mentioned are accentuated by this treatment. Endurance tests show that this metal is eminently adapted to resist fatigue, and experience in actual practice confirms these tests.

Test bars of this metal one-half inch in diameter and two inches long between measuring points, taken from prolongations left on the end of forgings for the purpose, show the following physical properties:

Tensile strength, 80,000 to 95,000 lbs. per sq. in.
Elastic strength, 50,000 to 65,000 lbs. per sq. in.
Elongation, 25% to 22%.
Contraction, 60% to 50%.

These records are taken from tests made on a carefully standardized testing machine, the elastic limit being determined by an electric micrometer, not by the drop of the beam, which method is approximate only, and might record anywhere from 2,000 to 10,000 lbs. per sq. in. higher.

Many railroads are now taking up the use of this metal generally, having tested it experimentally and found to their satisfaction that by a small initial increased expense they can save largely by having fewer breaks, with their attendant delays and damages.

The Semaphore Air Gage.

Mr. F. M. Nellis and Mr. S. T. Hutchins, of the Westinghouse Air Brake Co., have recently patented a pressure gage for air brakes which in mechanism is slightly modified from other gages of the Bourdon tube type, but which has certain decided improvements in the arrangement of the dial. In the gages almost universally used the numerals run from 0 to 160, inclusive, and the divisions occupy less than three-fourths of the complete circle. There is very little use for the numerals below 40 or above 120 for air-brake purposes. Thus, one-half the circle is not used or is used for numerals which are of little importance to the engineer watching the air pressure, and the really important divisions are so crowded that he cannot read accurately the single pounds. But a pound too little or a pound too much in making the initial reduction to take up slack, varies the braking force enough to cause destructive shocks. In the dial of the "semaphore" gage, as shown in the engraving, the complete circle has been used, mak-

can not know whether the main reservoir pointer was registering 90 lbs. or 10 lbs., but obviously this pointer could not register 10 when the train line pointer registers 70. The same principle holds true for all positions.

The large numerals only need concern the engineer; the others are kept for the use of the roundhouse machinist and the engineman will hardly see them from his seat.

What is considered the most important feature of the improvement is described as follows: All train braking is really done between 70 and 50 lbs. The pointer, at 70, indicates maximum train-pipe pressure. At 50 it shows that brakes are fully applied, and that any further reduction is a waste of pressure. All work is, therefore, done in one quadrant, and is marked by the position of the pointer, similarly as the semaphore signal communicates with the engineer, who, becoming accustomed to the gage, will brake from the position of the pointer rather than depend on the numerals. As a test of this principle, an engineer ran for three months with a "semaphore" gage, on whose dial were only three numerals, 50, 70



The Semaphore Air Gage.

and 90, and he was loud in praise of the new idea.

Another improvement in the gage, which is valuable, is in the form of the glass over the dial. This is convex, like a watch crystal, without any rim, and thus the position of the hands is visible when the gage is seen from one side. The face is black enamel, the train-line pointer white and the main reservoir-pointer red, which is a much better combination than the glaring polished face. The large opening in the middle of the dial has been closed and the lettering removed, making the numerals and the needles more conspicuous.

Interlocking Staff and Block Signals at Hilldale Tunnel on the Chesapeake & Ohio.

Most railroad tunnels in the United States are single track, but on many roads the increase of business has made it necessary to double-track the line, and it becomes important to utilize tunnels to the very best advantage, so as to avoid the heavy cost of enlarging them. An arrangement which accomplishes this object has lately been put in by the National Switch and Signal Co., at the Chesapeake & Ohio tunnel between Lowell, W. Va., and Hilldale. The double track ends at Lowell on the

staff is removed from the staff pillar and placed in the crane, in position to be taken by the engineman. The removal of a staff either from the Hilldale or the Lowell staff pillar prevents the removal of a second staff from the same pillar until the first staff has been carried to the opposite station or replaced in the pillar from which it was taken, and a staff cannot be taken out of both pillars simultaneously or as long as there is one staff removed from either. The placing of the staff in the crane is an order for the engineman, and the act of placing it in the crane makes a continuous circuit through the magnets of the electric slot on the home signal, and makes it possible for the operator to clear his signal. When the engineman comes along and takes the staff as an order to proceed through the tunnel, the circuit through the slot on the home signal is broken, and the signal immediately goes to danger automatically.

Another provision is also made to secure this result. Although experience has shown that an engineman seldom, if ever, misses the staff, it is possible for him to do so and proceed into the tunnel without it, and it is desirable to have the home signal go to danger immediately upon the entrance of the first pair of wheels within the limits of the tunnel block. In order to accomplish this, a short piece of track circuit has been introduced in advance of the home signal, near the staff crane, so arranged that the presence of a pair of wheels on this circuit de-energizes the electric slot, and the home signal goes to danger the same as if the staff were removed. This slot circuit is also used as the locking circuit, and after the derail has been closed and the home signal cleared the operators cannot again open the derail until the train has passed from this circuit, thus avoiding the possibility of opening a derail immediately in front of a cannot again open the derail until the train has passed from this circuit, thus avoiding the possibility of opening a derail immediately in front of a train moving at high speed. This electric locking, which was illustrated in the Railroad Gazette of Sept. 10, 1897, may be briefly described as follows:

An electric lock is placed on the machine frame in front of the tappet operating with the latch handle of the derail lever. This lock is so designed that when there is no current in the lock magnet the plunger falls by gravity through a hole in the tappet, and it is impossible for the operator to raise or lower the tappet so long as the bolt remains in this position. As soon, however, as the magnets are energized the movement of the armature pulls the bolt free from the tappet, and the operator can then change the position of his signal. The normal position of this lock frees the lever, the derail being open. When it is desired to clear the home signal, the first act of the operator is to reverse the derail lever, closing the derail and locking it on the ground through the facing point lock; he then reverses the home signal lever, clearing the home signal. The act of reversing this home signal de-energizes the electric lock magnets by shunting the current through a knife switch on tail lever of home signal, and the bolt plunges through the tappet, as before described; and although the operator may at any time replace the home signal to danger, this act does not renew the current, and the derail remains closed and locked until the train has passed over and beyond it, except

in case the current is renewed by the hand release which is furnished for the purpose of enabling the operator to change his signals in case a train does not require the signals after they have been cleared, or in case there is failure of the track circuit. This hand release is in this case a simple switch inclosed in a box having a glass case, the key of this box being in the hands of the signal inspector and not in the possession of the signal operator. In case it is absolutely necessary to use this release switch, the operator is compelled to destroy the glass, which action must be reported, with explanation of cause.

In order to insure that the derails at both Lowell and Hildale cannot be closed at the same time, a staff lock is placed on the derail lever. When a staff is removed from the pillar it is placed in the staff lock on the derail lever and the lever unlocked and reversed, closing the derail. The staff is then removed from the staff lock and placed in the crane. The derails and switches at the other end of the tunnel remain locked in the normal position, and cannot be unlocked until this train staff is carried through to that end of the tunnel. This absolutely prevents the engineman from overrunning the signal at either end while an opposing train has the right to the road.

The handling of traffic between Lowell and Hildale may be described as follows: We will suppose a train approaching Lowell westbound. The operator, observing its approach, or being advised of the time of its arrival either by telegraph or otherwise, asks the operator at Hildale for an unlock to permit him to remove the staff. If a train has been given a clear signal at Hildale to go to Lowell, this unlock cannot be given. The derail No. 5 will remain open, and signal No. 7 remain at danger, which will necessitate the stopping of the westbound train at the home signal, or else, if it should not stop, it will be derailed. If, however, there is no train between Hildale and Lowell, and the operator at Hildale has not cleared his signal, he will give Lowell an unlock, which permits him to remove a train staff. Having withdrawn this staff from the pillar, he places it in the staff lock on the derail lever and unlocks the derail lever No. 5. This lever also being connected with the switch No. 5, by reversing it he sets the switch for a westbound movement and closes the derail, and the opposing derail and switch at Hildale remain locked in the normal position. He then removes the staff from the staff lock, and places it in the crane outside of his cabin, which act energizes the magnets on electric slot on home signal No. 7. He then reverses home signal lever No. 7, and the westbound train proceeds under a clear signal. The entrance of a pair of wheels into the block section beyond the derail No. 5 or the removal of the staff from the crane de-energizes the magnets of the electric slot on home signal No. 7, which immediately goes to danger. The engineman now proceeds through the tunnel, having absolute protection in front by the fact that the home signal at Hildale is at danger and the derail open, and protection in the rear through the home signal No. 7 being at danger; and as soon as the rear end of his train has passed the short track circuit beyond the switch the operator can open his derail, so that the train is then moving on a single track, protected by an open derail in front and rear on the lines which might otherwise admit an opposing train. And since the signalman at Lowell and Hildale cannot remove a second staff as long as the first one issued remains out of either pillar, they cannot give orders for an opposing train to enter the block nor for a second train to follow the first into the section, so the engineman on this westbound train absolutely controls the movement of traffic over the section between the home signals at Lowell and Hildale until he has reached Hildale and delivered this staff to the signalman at that point.

No diminution of speed is required in picking up the staff. In daily practice it is picked up at a speed of from thirty to forty miles an hour without any automatic mechanism, but simply by the hand of the engineman. The National Company makes a crane and catcher, however, by which staffs can be taken by trains running at the highest speed.

This apparatus was designed and furnished by the National Switch and Signal Company, of Easton, Pa., and the plant was put in under the direction of F. W. Scarborough, Assistant Engineer, M. W., of the Chesapeake & Ohio, at Hinton, W. Va. The staff instruments have been in operation at this tunnel for some time, but the auxiliary locks, slots and derails were lately added. The apparatus with these improvements has proved so satisfactory that the Chesapeake & Ohio has decided to add electric locking, electric slots and derails at other points where now only the train staff is used.

CHARLES HANSEL,
M. Am. Soc. C. E.

Proposed Massachusetts Street Railroad Laws.

We gave in our issue of Feb. 18 the substance of the report recently made to the Legislature of Massachusetts by a special committee appointed last year. Below we give a synopsis of the two bills, prepared by the committee, embodying new laws, and amend-

ments to the old ones, proposed in the report. The first bill contains 23 sections and the second one four sections. Under the laws now in force in Massachusetts street railroad (and other) corporations are taxed practically on the value of their capital stock at its market value. The law provides that real estate and machinery shall be assessed locally, and that a tax shall be paid to the State on the value of the share capital, minus the aggregate assessments made by the towns and cities on real estate and machinery. The rate of the State tax is made the same as the average rate of municipal taxes for the same year. During the last 15 years this has been about 1½ per cent. Under an old decision of the courts the right of way of steam railroads is not taxed locally, so that with such corporations the local taxes are small in proportion to those paid to the State. Corporation taxes collected by the State are distributed to the towns in which the stockholders reside.

The first of the committee's proposed acts provides (Section 1) that "street railways" shall mean all tracks, poles, wires, etc., on, in, under or above public streets, operated by any motive power other than steam. Section 2 provides for the distribution of the State tax to the towns in which the railroads lie instead of to the towns where the stockholders reside. This change has already been made (last year) as regards the West End or Boston Elevated road. Section 3 provides that companies paying annual dividends in excess of 8 per cent. shall pay to the State a tax equal to such excess, but this does not apply to a company which has not paid dividends equal to 6 per cent. annually from the date of its organization. This provision also has already been made applicable to the Boston Elevated Company.

Section 7 prescribes the tax on gross receipts, ranging from 2 per cent. to 3 per cent. (as stated in the committee's report), designed to commute the expenditures now made by street railroad companies for paving and for clearing off snow, etc. This tax is to be paid directly to the towns or cities, and the money must be treated by such cities and towns as a separate fund, to be applied to the construction, repair and maintenance of public ways.

Section 10. Street railway companies shall not be required to keep any portion of the surface material of streets, roads and bridges in repair, but whenever the same is disturbed in the making, alteration, extension, repair or renewal of a railway the company shall, at its own cost, restore the surface of the street.

Section 11. Street railway companies may clear snow from their tracks, and must level it so as to make the highway safe for travel, but they shall not be required to remove the snow from the streets.

Section 12 prescribes the method of dealing with petitions for original locations of tracks. The city or town officers, after a hearing, may grant a location or any portion thereof, and may prescribe all necessary terms, conditions and obligations required by the public interest. If the majority in value, or 10 in number, of real estate owners abutting file a written protest within 30 days, the location must be approved by the State Railroad Commissioners, after a public hearing. No company shall commence construction until there has been time for protest; nor, in case such protest is filed, until the railroad commissioners have taken final action approving the location.

Section 13. City and town officers, in granting locations for extensions of lines of existing companies, may prescribe the manner in which the tracks shall be laid, the kind of rail, poles, etc., but shall not impose new conditions other than those applying to all street railroads, except such as were imposed in the original grant of location.

Section 15. Cities and towns may revoke locations after one year, subject to the approval of the State Railroad Commissioners, unless the company consent in writing. Where a location is revoked the company must restore the street.

Section 16. Street railway companies may run special cars at special rates, and may carry employees, policemen, firemen and children free; may also carry children's excursions free for charitable associations and may make special rates for scholars; but they shall not give free passes or reduced rates to city officers or employees, or any one else. The violation of the provisions of this section by a company may be alleged as a misdemeanor in any hearing before the railroad commissioners, upon appeal from an order of a board of aldermen or of selectmen revoking the location of such company; and if the board of railroad commissioners in its discretion so decides, shall constitute valid and sufficient ground upon which to approve of the revocation of such location or any portion thereof. The report states that this section is intended to put a stop to a recognized existing abuse from which public as well as corporate interests are believed to suffer. The usual penalty in such cases has not been imposed, "for the reason that its inefficiency has been established by experience."

Section 17. Whenever a street is widened for the purpose of laying a new street railroad therein a proportionate share of the cost of widening may be assessed upon the street railway company, but this assessment, with the amounts assessed on real estate, shall not exceed the total cost of widening.

Section 18 makes a similar provision for streets in which tracks have existed for five years. There may be assessed upon the railway company an amount not exceeding the total amount assessed upon real estate and not exceeding one-quarter of the total cost of widening. Section 20 authorizes corporations to issue capital stock for the expenditures just referred to.

Section 21. City and town officers may apply to the State Railroad Commissioners to revise and regulate fares, but such fares shall not, without the consent of the company, be reduced below the average fare for similar service on other lines operated under similar conditions. Regarding this section the report says: This is a substitute for Section 44, Chap. 113, of the present law, which defeats itself. "It provides that no reduction shall be made without the consent of the company, by which fares shall be so reduced as to yield, with all other profits derived from operating its road, an income of less than 10 per cent. upon the actual cost of construction, etc.

Circumstances can be readily imagined in which the growth of traffic is prevented by an unreasonable scale of fares. The company operating the street railway may not earn 10 per cent. upon its cost of construction, for the very reason that the growth of traffic is impeded by the scale of fares charged. Nevertheless, under the existing law it would seem to be impossible to reduce those fares. The measure for what constitutes reasonable fares here proposed is that now in practical use, which it is thus sought to incorporate into the law in place of the old rule above referred to, which is either inoperative or open to the objection stated."

Section 23 provides that this law, so far as it relates to the distribution of taxes or the imposition of the new taxes, and in other miscellaneous respects, shall take effect at the close of the present street railway year. But as the communication tax provided for in Sections 6 and 7 affects, to a greater or less extent, the methods of bookkeeping of the companies, that provision is not to take effect until the 1st of October, 1899.

The committee's second bill is to authorize cities and towns to construct tracks in public ways or to acquire the same. Tracks built by the city or town shall be maintained and kept in repair like other portions of the streets or ways in which they are laid, and any street railway company may run cars over the same with the consent of the proper authorities of such city or town, and upon such terms and regulations as may be mutually agreed; but nothing contained in this act shall be held to authorize towns or cities to run cars upon such tracks or otherwise to operate street railway. Under Section 2 any city or town may take and possess the track, poles and fixtures, etc., of a company upon giving the company six months' notice, but such taking shall not constitute a revocation of the location or affect the company obligation or right to run cars over the tracks taken. By Section 3 compensation is to be made according to the law for taking property for laying out streets, but it shall not exceed the cost of replacing the track and structures taken.

Section 4. Companies shall continue under the same obligations, etc., but they shall, in addition to all other taxes or payments, pay the city or town a further sum, to be fixed by mutual agreement, for periods not exceeding seven years. If the parties cannot agree on the price it shall be fixed by three referees, to be appointed by the Supreme Judicial Court. The award of said referees shall be based on the payment of interest on the actual cost of the tracks in question, together with a reasonable allowance for the repair and renewal of the same, but shall include no other items and no additional franchise tax; and it shall continue in force for the period of seven years, unless set aside by a revocation of locations, or altered by mutual consent.

New Railroad Building in 1897.

According to the revised figures given below, the total mileage of new roads built in the United States last year (exclusive of second track and sidings) was 2,108.82. This is an increase over the estimated mileage which we gave in the "Railroad Gazette" for Dec. 31, of 170.50 miles. Doubtless even this later total does not represent the entire new mileage of last year, but it may be accepted as the minimum amount until revisions some months later can determine the exact figures. By this corrected total the new mileage of last year exceeds that of 1896, which, according to Poor's Manual, was 1,996.72, and that of 1895, which was 1,922.25; but it is lower than the new construction of 1894, which Poor puts at 2,263.97 miles, and, of course, is far below that of 1890 to 1892 and earlier years. The corrected total still leaves California in the lead with 221.14 miles. Next comes Arkansas, 151.2 miles; Michigan, 144.31; Louisiana, 144; Wisconsin, 142.1; Pennsylvania, 124.29; Alabama, 122.5; Georgia, 117.7; Missouri, 109.2, and Mississippi, 108.9 miles. Several of the States and Territories have scarcely more than a mile each to their credit, and in some, so far as known, no construction has taken place during the year.

New road-building in Canada, according to the totals below, reached 395.62 miles, and in Mexico, 317.4. The figures by States are as follows:

New Railroad Built in 1897.		Miles.	
States.	Miles.	States.	Miles.
Alabama	122.5	New Jersey	15.9
Alaska	8	New York	23.73
Arkansas	151.2	North Carolina	46.03
California	221.14	North Dakota	36.28
Colorado	19.5	Ohio	5.28
Delaware	25	Oklahoma Territory	27.5
District Columbia	2	Oregon	31
Florida	37	Pennsylvania	124.29
Georgia	117.7	South Carolina	10.5
Idaho	24	South Dakota	1.25
Illinois	95.97	Tennessee	22
Indiana	37	Texas	94.05
Iowa	8	Utah	1.25
Kansas	1.73	Vermont	3.3
Kentucky	22	Virginia	12.3
Louisiana	144	West Virginia	37
Maine	29.35	Wisconsin	142.1
Massachusetts	5.26		
Michigan	144.31	Total 40 States and Territories	2,108.82
Minnesota	43.32		
Mississippi	108.9		
Missouri	109.2	Canada	395.62
Montana	13.9	Mexico	317.4

Particulars as to the new construction of individual roads, with the routes are given in detail below:

UNITED STATES.

Alabama.

Florida, Alabama & Northern.—Extension to the State Line	5
Hamilton Creek Ore.—From Rockwood to Hematite	3.5
Middle Tennessee & Alabama.—Extension from Madison Cross Roads to Clutesville	7.5
Mobile & Ohio.—From the Mississippi State Line toward Montgomery to the end of track	65.25
Mobile, Jackson & Kansas City.—From Mobile to Mississippi State Line	30
Seaboard.—From Tiger to Chatham	5.25
Plant System.—Southwestern Alabama Extension from Dimmicks toward Enterprise	15
Yellow River.—Extension to Florala	1.5

Total

Alaska.		Louisiana.		North Carolina.	
Chilcoot Railroad & Transportation Co.—From Dyea to Chilcoot Pass.....	8	Kansas City, Pittsburg & Gulf.—From Many to Sabine River, 105.5 miles; Lake Charles branch, 16.5 miles; total.....	122	Aberdeen & Rock Fish.—From Junction to Raeford.....	11
Total	8	Louisiana & Arkansas.—From Arkansas State line to Cayle	4	Atlantic Coast Line.—From Wilmington to Fernside	2.75
Arkansas.		Louisiana & Northwest.—Extension from Homer north	1.5	Carthage.—From Carthage to Cassover, 10.22 miles; from Carthage to Curriersville, 11.38 miles; total	21.6
Arkansas & Choctaw.—From Goodland to Arden 7 miles; from Arden to Carson 5 miles; total	12	Mansfield Railway & Transportation.—From Mansfield to Mansfield Junction, a point on the Texas & Pacific.....	2	Durham & Charlotte.—Extension from Glendon to Johnson City	5
Arkansas Central.—From Ft. Smith to Central City	13.5	Texarkana & Shreveport.—From Kiblah to Wallace	10	Seaboard Air Line.—From Great Falls spur to Roanoke Rapids	2.65
Deckerville, Osceola & Northern.—From Deckerville toward Osceola.....	12	White Castle & Annandale.—From White Castle to Annandale.....	4.5	Wellington & Powellville.—From Ahokey toward Windsor	3
Freed Valley & Saline Valley.—New line to Holly Springs	12	Total	144	Total	46.03
Jonesboro, Lake City & Eastern.—From Nettleton to Lake City.....	12.2	Maine.		North Dakota.	
Kansas City, Pittsburg & Gulf.—From Rust to Horatio	53	Bangor & Aroostook.—Aroostook Northern extension from Caribou to Limestone.....	15.5	Great Northern.—From Langdon to Hannah, 20.16 miles; from Cavalier to Waltham, 16.13 miles; total	36.29
Louisiana & Arkansas.—From Taylor to Palestine 18.5 miles; from Welcome to Louisiana State Line, 1 mile; total.....	19.5	Penobscot Central.—From West Market square, Bangor, to Steamboat Wharf.....	.35	Ohio.	
Noble Lake & Southern.—From Noble Lake to Ladd	4	Portland & Runsford Falls.—From Rileys to Chisholm Mills	3.5	Pennsylvania Co.—Beaver Dam Valley branch from New Philadelphia to mines of the East	5
St. Louis & San Francisco.—Extension of St. Paul branch from St. Paul east.....	9	Wiscasset & Quebec.—From Albion toward Burnham	10	Wheeling & Lake Erie.—From Terminal Junction to Martins Ferry .....	.28
Texarkana & Shreveport.—Extension to Kiblah	4	Total	29.35	Total	5.28
Total	151.2	Massachusetts.		Oklahoma Territory.	
California.		Chester & Becket.—From Chester to Becket....	5.26	Choctaw, Oklahoma & Gulf.—From Ft. Reno depot to the Ft. Reno Post.....	.8
Eureka & Klamath River.—Extension of the terminal at Buckman's.....	1	Michigan.		Hutchinson & Southern.—From Medford to Kansas line	22
McCloud River.—From Upton to McCloud....	21.8	Detroit & Lima Northern.—From Dundee to connect with Lake Shore & Michigan Southern branch recently purchased, 5 miles; South	17	St. Louis, Oklahoma & Texas.—From Tecumseh to Choctaw Junction.....	5
Pacific Coast.—From San Luis Obispo to Bishop's Peak	3	Adrian to Tecumseh, 12 miles; total.....	17	Total	27.8
Randsburg.—From Kramer to Johannesburg....	29.5	Detroit & Mackinac.—From La Roccque to Onaway	20	Oregon.	
San Francisco & San Joaquin Valley.—From Fresno to Kern-Tulare Co. line, 71 miles; from Fresno to Visalia, 47 miles; total.....	118	Grand Rapids, Kalkaska & Southeastern.—From Vanburen to Stratford.....	33	Astoria & Columbia.—From Astoria to Clifton.....	21
Sierra of California.—From Oakdale to Jamestown	42.0	Hecla & Torch Lake.—From Calumet to South Hecla	2	Columbia Southern.—From Biggs to Wasco....	10
Southern Pacific.—From near Salinas to Sugar Factory, 2.82 miles; from Pomona Junction to South Pomona, 2.24 miles; total	5.84	Lake Superior & Ishpeming.—Extension at Ishpeming	1.6	Total	31
Duarte extension, .78 miles; total.....	5.84	Manistique & Northwestern.—From end of track to Steuben, 10 miles; from Steuben to Camp Sixty-Six, 15 miles; total.....	25	Pennsylvania.	
Total	221.14	Milwaukee, Benton Harbor & Columbus.—From Benton Harbor to Buchanan.....	27	Beech Creek.—From Wigton Colliery Junction toward Spangler, 6.65 miles; from West Branch Junction to West Branch Colliery, 8 mile; from Empire Junction to Empire Colliery, .64 mile; total	8.09
Colorado.		Munising Railway.—From Stillman to end of track, 6.25 miles; from Rumely to Little Lake, 12.46 miles; total.....	18.71	Kinzua & Tiona.—From Dewdrop toward Tiona	5
Colorado & North Western.—From Boulder to Sunset	13	Total	144.31	Lewisburg & Buffalo Valley.—From Lewisburg to Kulpville	16
Florence & Cripple Creek.—Golden Circle extension from Goldfield to end of track.....	.5	Minnesota.		New York, Susquehanna & Western.—Susquehanna Connecting line from Paddysland to Minoaka, 7 miles; from Jermyn Junction to Jermyn Breaker, 1 mile; total.....	8
Midland Terminal.—To Cripple Creek.....	3	Duluth & Iron Range.—From the Junction to Roberts Mine, 2 miles; to Sparta Mine, .5 mile; total	2.5	North Bend & Kettle Creek.—Extension of Lebo Run branch	1.5
Rio Grande & Pagosa.—Extension.....	3	Duluth, Missabe & Northern.—From Hibbing to Pillsbury Mine	2.5	Oregon & Texas.—From Silver Springs toward Oregon Hill	2
Total	19.5	Great Northern.—Park Rapids & Leech Lake extension from Park Rapids to Akeley.....	18.32	Pennsylvania.—On the Scalp Level line from Lovett to Scalp Level, 12.6 miles; new line through New Brunswick, 1.7 miles; total.....	14.3
Delaware.		Itasca Lumber Co.—From the Mississippi River to Pearl Lake.....	20	Pennsylvania Co.—Northern Central Division from Goldsboro to New Cumberland, 8.1 miles; from Georgetown to Herndon, 3.1 miles; total	11.2
District of Columbia.		Total	43.32	Pittsburgh & Eastern.—From Glen Campbell to Fuller Run	1.2
Chesapeake Beach.—From Washington to District Line	2	Mississippi.		Pittsburgh, Bessemer & Lake Erie.—From Butler to Pittsburgh	42
Florida.		Boyle & Sunflower River.—From Boyle to Kimble Lake	9	Quakertown & Eastern.—From Quakertown to Springtown	9
Atlantic, Suwanee River & Gulf.—From Alachua to Clarke	9	Chickawsaha & Jackson.—From Robinson Switch on the Mobile & Ohio to west line of Wayne County	30	Wilkesbarre & Northern.—From Dallas to Harvey's Lake	6
Ellaville, Westlake & Jennings.—From Westlake toward Belleville.....	7	Columbia, Lumberton & Gulf.—From Lumberton to the Gulf & Ship Island.....	22	Total	124.29
Fort White & Southern.—From Sautafe River to Springfield Mine	1	Laurel & Northwestern.—From Laurel.....	12	South Carolina.	
Gainesville & Gulf.—From Irvine to Ft. Drain.....	1	Mobile & Ohio.—From Columbus to the Alabama State line	8.9	Ohio River & Charleston.—Blacksburgh to Gaffney	10.5
St. Mary's, Lake City & Gulf.—From the Georgia line toward Lake City.....	19	Mobile, Jackson & Kansas City.—From the Alabama State line to Mallett.....	7	South Dakota.	
Total	37	Yazoo Delta.—From Morehead to Ruleville....	20	Chicago & Northwestern.—Fremont, Elkhorn & Missouri Valley extension from Portland to Crown Hill	1.25
Georgia.		Total	108.9	Tennessee.	
Atlantic, Valdosta & Western.—From Haylow to Suwanee River.....	25.25	Missouri.		Tennessee & Cumberland River.—From Bear Spring toward Tennessee Ridge.....	7
Augusta Terminal.—Within the City of Augusta	2.75	Kansas City & Northern Connecting.—From Kansas City toward Pattonsburg.....	31.5	Tennessee Northern.—From La Follette Junction to La Follette, 10 miles; from La Follette to Warren, 2 miles; total.....	12
Dooly Southern.—From Richwood to Pinla.....	11	Missouri, Kansas & Texas.—Spur for bridge approach at Jefferson City.....	1	Union Ry. Co. (Belt Line).—From Mississippi River bridge to McGee station.....	3
Fitzgerald, Pinebloom & Valdosta.—Extension from the Ocmulgee River.....	4.5	Morley & Morehouse.—From Morley to Morehouse	16	Total	22
Georgia Pine.—From West Bainbridge to Corea St. Mary's, Lake City & Gulf.—From Reynolds-town to Maxwell, 15 miles; from Charlton south to the Florida line, 6 miles; total.....	21	Omaha, Kansas City & Eastern.—Trenton to Pattonsburg	31	Texas.	
Sparks, Moultrie & Gulf.—Completion to Moultrie	24	Paragould Southeastern.—From Cardwell to Hornersville	10.7	Beaumont Wharf & Terminal.—On belt line around Beaumont	1
Stillmore Air Line.—Addition to the main line at Stillmore .....	.2	St. Louis, Kennett & Southern.—From Kennett to Arbyrd	16	Colorado Valley.—From Sweetwater to Ada... ..	7.5
Valdosta Southern.—Extension to Florida State line	4	Total	109.2	Ft. Worth Stock Yards Belt.—Extension at Ft. Worth .....	.8
Total	117.7	Montana.		Gulf, Brazos Valley & Pacific.—From Junction with the Texas & Pacific to Peek City, 2 miles; from Grade to Mineral Wells, 10 miles; total	12
Idaho.		Great Northern.—Montana Central line from Cottonwood Junction to Stockett.....	5.3	Gulf, Colorado & Santa Fe.—From Belton Junction to Belton	1.25
Boise, Nampa & Owyhee.—From Nampa to Guffey	24	Northern Pacific.—Gaylord & Ruby Valley extension from Ronovo toward Twin Bridges..	8.6	Kansas City, Pittsburg & Gulf.—From the Sabine River to Beaumont.....	23
Illinois.		Total	13.9	Orange, Call & Pine Belt.—From Salem to Call.....	14
Centralia & Chester.—From Evansville to Chester	18.6	New Jersey.		San Antonio & Gulf.—From Cibolo to Stockdale	10
Chicago, Hammond & Western.—From La Grange to Franklin Park.....	8.87	Pennsylvania.—From the Delaware River to Haddonfield	5.9	Sherman, Shreveport & Southern.—Extension into timber lands	10
Illinois Terminal.—From the city limits of Alton east to Wood River.....	2	South Jersey.—Ocean City branch from Petersburg to Ocean City.....	10	Texas, Arkansas & Louisiana.—From Atlanta to Bloomburg	8
Peoria & St. Louis.—On line from Green Valley to Springfield	2	Total	15.9	Texas Central.—From Ross to Texas Central junction of the Missouri, Kansas & Texas..	1.5
St. Louis, Peoria & Northern.—From Springfield to Peoria	58.5	New York.		Total	94.05
Toluca & Eastern.—Toluca to Rutland.....	6	Buffalo, Attica & Arcade.—A spur in Arcade Village to the Station.....	1.51	Utah.	
Total	95.97	Erie & Central New York.—From Cortland through Solon to end of track.....	10	Oregon Short Line.—Extension at Lehi Junction	1.25
Indiana.		Lehigh & New England.—From Wilcox to Po-chuck	2	Vermont.	
Findlay, Ft. Wayne & Western.—In the city of Ft. Wayne, main line extension.....	.37	Lehigh Valley.—Extension of the Rochester Southern at Rochester .02 mile; extension of the Depew & Tonawanda, 1.05 miles; Seneca Co. branch from Mainland Junction to Waterloo, 5.15 miles; total.....	6.22	Canada Atlantic.—Section of line from Lacolle Junction, Québec, to Alburgh Junction, Vt., ..	3.5
Iowa.		South Vandalla & State Line.—From South Vandalla to the Chipmuck Run.....	4	(Continued on page 144)	
Staceyville.—From Staceyville to Mona.....	8	Total	23.73		
Kansas.					
Atchison, Topeka & Santa Fe.—From end of line at Frontenac to connect with Medway Railroad	1.73				
Kentucky.					
Brookville & Wellsburg.—From Brookville to Wellsburg	10				
Licking Valley.—From Salt Lick to Yale.....	12				
Total	22				



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

Mr. Aldace F. Walker, long a member of the Inter-State Commerce Commission, in a recent paper, says: "The railroads of the United States in many respects are helpless creatures. Their natural tendency appears to be to run down the hill into the sea. Their competitors on every side plunder them. Their only weapon of retaliation or defense is the reduction of their earnings, in the hope that it may injure the others more." With dollar wheat, owing to bad harvests abroad and fair harvests here, our railroads are doing better than usual, but this exceptional situation cannot last and then what will they do? The lion in the path is the prohibition of pooling in the Inter-State Commerce law, or, in other words, the denial of the right of contract which all other persons, individual or corporate, enjoy. The expected decisions of the Supreme Court of the United States in the Joint Traffic and Nebraska cases may throw a side light on the situation as to the bearing of the Sherman anti-trust law, but the main question of the right of contract will remain, and the men in charge of these large interests must judge as to whether they can more successfully appeal to the present or future Congresses to grant it. Suppose the next House of Representatives should have a Democratic and Populistic majority. Suppose good harvests abroad reduce the demand for and consequently the price of American cereals. Would the present advocates of an obstructive or a laissez faire policy be in a comfortable position? Special situations naturally bias judgments, but we must remember that "the speed of the column is that of the slowest horse," and that "in organization there is strength." The present position of the commercial bodies is favorable, but specially favored interests are making themselves felt there against pooling and this is an element which should be considered. It is evident that the lack of agreement among prominent railroad men as to what legislation is needed is as obstructive at Washington as anything connected with the populistic and socialistic tendencies of the times, and there may be more wisdom in submitting to the decision of the Inter-State Commerce Commission the question what is a fair rate (subject to review by the courts), than to oppose all public authority over rates.

It is increasingly apparent that the railroads will have to join in a concerted effort to convince Congress of the rightfulness of a law to permit pooling, if they wish to realize their hopes. Only a part of the mercantile community is in favor of such a law and that part is lukewarm most of the time because the philosophy of the benefit of pooling is so obscure that shippers have not fully grasped the idea. They do not give much thought to their own interest in the matter, but are actuated chiefly by their desire to do justice to the railroads; and the desire to see justice done to other people is seldom so strong that men sit up nights to nurse it. It is about the same with the more conservative element in Congress.

Senator Cullom himself, while not unfriendly to railroad interests, seems to deem it his first duty to look out for the Inter-State Commerce Commission. While he would consider a proposition from railroad advocates to add a pooling permit to his bill introduced last month, he would not propose such a thing himself; such action would be inconsistent with his "political and economic attitude." This we gather from the Journal of Commerce, whose Washington correspondent seems to be well informed as to the real sentiments of congressmen. This correspondent intimates that Mr. Cullom is now about the only congressman who takes an active and intelligent interest in legislation concerning inter-state commerce by railroads, Messrs. Storer and Cowen being now out of Congress. But if railroad men desire to take an active part in getting Congress to legalize pooling (or any other contract right) they will need to take their lawyers and go to Washington for a considerable siege with the committees, for the bill that has been introduced by Mr. Cullom, at the instance of the Inter-State Commerce Commission, is long and very carefully drawn and full of legal subtleties. Possibly it may be easy to induce Congress to exercise the negative virtue of not passing the bill in its present form (it contains no reference to pooling), but to arouse the members to the positive virtue of carefully considering the different sections on their merits, and in connection with a pooling clause, will be no easy task. A policy of inaction or a purpose to get Congress to follow such a policy is by no means a safe expedient for the railroads to take, for besides the possibility that Congress may, by some unexpected whim, pass unreasonable restrictions, there is the danger that the friends of the scalpers will take advantage of any feeling of this kind to get the ticket-brokerage bill laid aside. It has already been proposed that the anti-scalper bill and the general inter-state commerce bill be consolidated, which would be a fine scheme to kill both.

Earnings and Expenses.

As the returns of gross and net earnings for the past year come in it is interesting to note to what an extent recent profits have been affected by greater or less "economy" exercised in the lean years since 1893. Coincident with a great decrease in traffic there is possible, usually, a decrease in expenses in still greater proportion, especially in maintenance of rolling stock, the lighter traffic making it possible and usually advisable to side-track cars needing important repairs so long as the remaining stock is sufficient for the traffic. Moreover, very many of our railroads in seasons of prosperity make important improvements which are charged to working expenses and not to capital; and naturally this ceases when there is no surplus available for such expenditures.

Among the railroads which suffered most in 1893 and after was the Chicago, Burlington & Quincy. Its gross earnings, which had been \$33,002,000 in 1892, and \$31,043,000 in 1893 (a great decrease in freight in the last half of the year partly counterbalanced by a great increase in passengers on account of the World's Fair), fell to \$24,667,000 in 1894. But the working expenses fell from \$21,224,000 in 1893 to \$16,284,000 in 1894. The company's report frankly stated that the depreciation in the rolling stock not made good during the year amounted to about a million. Disasters to the crops in Kansas and Nebraska, together with the general depression of business, kept down the earnings of this company until last year, and the expenses have been kept down also. Now last year, when the gross earnings increased \$5,714,000 over those of 1896, the expenses have increased \$4,364,000.

On the other hand, the Chicago & Northwestern, which may be said to adjoin the Burlington on the north, when its gross earnings fell from \$32,472,000 in 1893 to \$29,119,000 in 1894 (10 1-3 per cent.), decreased its expenses only \$1,642,000, or less than 8 per cent., against the Burlington's decrease of 21 per cent. in earnings and 23 per cent. in expenses. There was a slight further decrease in expenses in 1895 on the Northwestern, but in 1896 they were nearly as great as in 1893. The great wheat crop in the Dakotas and Minnesota in 1895 and some temporary revival in the iron industry, was of great benefit to lines like the Northwestern's. We may assume that any depreciation suffered in 1894 and 1895 was made up in 1896.

Now one of the results of this is that last year, when the gross earnings were \$1,394,000 greater than in 1896, the expenses were only \$208,000 greater. From the above increase in gross earnings it was able to increase its profits by \$1,186,000; while the

Burlington, from an increase of \$5,714,000 in gross, more than four times as great as the Northwestern's, made an increase in net of only \$1,350,000, or only one-eighth greater than the Northwestern's. More than 76 per cent. of the Burlington's increase in earnings was absorbed by the increase in expenses; only 15 per cent. of the Northwestern's. Evidently a considerable part of the sums expended by the Burlington last year are properly chargeable against the earnings of previous years.

All this should be borne in mind by those speculators who are urging the declaration of increased dividends as soon as they hear of increased earnings. And there is something more for them to remember. Some railroad companies during the bad years have given their shareholders not only all their surplus net earnings, but more. The Northwestern even had a deficit amounting to \$1,657,000 in 1894 after paying dividends, which, however, were exceeded by the surplus in the following year. The Burlington, in the three years from 1894 to 1896, had a deficit every year, aggregating \$1,687,000, which is more than 2 per cent. on its stock. This is \$337,000 more than the increase in net earnings last year.

With such things as these in mind we have heretofore said that the very best news from many of our railroads, when they begin to thrive, is a large increase in working expenses; and that the companies should not be in haste to increase dividends, however clamorous the speculators for a rise.

A Government's Experience in Railroad Building.

One of the means by which the new Kingdom of Italy, formed out of numerous separate provinces long independent of each other and often hostile to each other, was to be held together, unified and made to feel the benefits of the new government, was a system of railroads, not only connecting the lines already in operation, but penetrating many districts where the prospect of profitable returns on the investment was too remote to tempt capitalists.

By a law passed in 1879 a plan for such an extension of the railroad system was provided, to be begun immediately and prosecuted rapidly and almost simultaneously. It is easy to understand that this scheme was extremely popular in all the districts where new lines were to be built, and that it would have been difficult to pass it if it had provided only for taking up one line after another, so that one district would wait for years for the benefits which another was already receiving. But one of the results was that the amount of work to be done at once vastly exceeded the powers of the country's engineering and administrative forces. Estimates were made after insufficient survey and examination of the ground, and apparently with the determination not to discredit any line by its cost; and contracts were made by which expenditures could be increased almost indefinitely, and with insufficient control, and local authorities in many cases acted very much as if in league with the contractors to make the cost as great as possible.

Although all this was notorious and often came to the attention of the Italian Parliament, it was not until 1894 that this Parliament provided for a commission which was to investigate the construction of nine different lines, six of which had been completed as early as 1889, and one each in 1891, 1893 and 1894—an excessively long time elapsing between the stealing of the horse and the locking of the stable door. In fact, the door is not locked yet, for the report of this commission was not made until 1896, and many of the illegal and corrupt acts discovered were then attained.

It appears from this report that the cost of the construction of the nine lines reported on (319 miles of road) was estimated at \$40,579,000, and the government actually paid out on them \$70,582,000—\$29,003,000 a mile, almost as much as the magnificent railroads of Great Britain. A line less than 15 miles through the mountains a little north of Genoa (with a very long tunnel), estimated to cost less than \$5,000,000, actually cost nearly \$15,000,000, and though a large part of the difference was due to unforeseen difficulties, a large part of it also, says the investigating commission, was due to dishonesty and negligence on the part of the contractor and the resident officials. On a line over the Apennines between Florence and Faenza (which is of very little use now that it is built), a tunnel some two miles long was estimated for as if through solid rock; instead of this, after penetrating some 1,000 ft., the excavation was through clay for nearly a mile. But this did not make the work any cheaper; on the contrary, the contractor put in claims for flooding, destruction of works, etc., which were all readily granted, so that the cost of this comparatively short tunnel rose to \$1,690 per running meter, against \$800 for the St. Gothard Tunnel.

All of this may lead us to suppose that sins of omission and commission in the prosecution of public works are not peculiar to American city governments, canal administrations and the like, and that Satan is pretty sure to exercise his trade in the Old World as well as the New, wherever a chance is given to him. The art of government consists in giving him the fewest pos-

sible chances, but the art of the actual governors seems to be, in many cases, to give him as many as possible.

As summarized at the time, it turns out that the agreement made at the recent meeting of Southwestern lines in New York to restore rates in that territory was made without the co-operation of the Lone Star Steamship Company, and hinged upon an agreement between the rail lines and the other steamship lines providing that the latter would advance rates if the former would cut off all relations with the Lone Star line. Naturally enough, the Lone Star people objected strongly to such an arrangement and at once in the United States Court applied for and obtained a temporary injunction requiring the railroads "to maintain the same relations with the Lone Star Line with respect to rates, divisions and freight as are by them granted to the Mallory Line." The sympathy of the public is, no doubt, largely with the Lone Star Line, as the public has been the only apparent beneficiary from the inauguration of the line. Certainly, the owners of the line cannot have made much money in carrying freight at the ruinously low rates which prevailed all last season. On the other hand, the old steamship lines must have suffered seriously in their attempt to "freeze out" their new competitor. The Texas rail lines, as well as the trans-continental roads, have also suffered from the demoralization of rates forced upon them by the steamship war. In the failure of all efforts to settle the difficulty it may have seemed to the railroads that the so-called boycott was the only remedy likely to be effectual; but probably the remedy is worse than the disease. While common carriers may decline to join in through rates with connecting lines, the courts probably will compel them to afford to one connection all the privileges which they voluntarily concede to another. In this case the associated roads are likely to find it difficult, as well as troublesome, to defend their action in refusing the Lone Star line participation in the same rate which they voluntarily accept on business exchanged with the Mallory line, which is, as we understand it, all the Lone Star line asks. The past week has also seen another somewhat similar attempt to "restore" these same Texas rates in another direction. The Kansas City, Pittsburgh & Gulf has persistently refused to join the Southwestern Association and has claimed the right (and exercised it) to make any rates it saw fit, to get business. In pursuance of this policy it has, as claimed by the other lines, contributed largely to this same demoralization of rates. The associated lines determined, it seems, to apply like drastic treatment to this line—agreed to cancel all other rates and divisions with it. The Pittsburgh & Gulf, like the Lone Star, promptly applied to the Federal courts for an injunction restraining the other roads from carrying out the proposed arrangement, and secured a temporary restraining order, and dispatches from Kansas City state that the Atchison, the first line proceeded against, has withdrawn its notice. A report is also current that the Kansas City, Pittsburgh & Gulf has formed an alliance with the Chicago Great Western, which refused to become a party to the joint move against the K. C., P. & G.

The Kingdom of Wurtemberg, which has a little more than 2,000,000 inhabitants, and an area a little greater than that of Massachusetts, in 1893 introduced a novel kind of season ticket (though similar tickets had been in use in Belgium and Denmark) called a "national ticket," good for the holder only, for passage at will on all the railroads of the country, their length aggregating 1,090 miles—all State railroads—for the period of fifteen days, in express as well as ordinary trains. The short period of their validity is the peculiar feature. These tickets are sold for 45 marks first-class, 30 second-class and 20 third-class (\$10.80, \$7.20 and \$4.80.) Season tickets for the year and for three months had been offered for a long time, but were little used, and it was hoped that the fortnight tickets would be more popular. They became so immediately and have become more and more so since, the number sold yearly having been:

1894.	1895.	1896.	1897.
13,378	16,600	18,796	22,031

The largest number of first-class tickets of this kind sold in any one year was seventeen; of second-class 3,870, and 82 per cent. of the whole number last year were third-class tickets. The receipts from them have not been very large, amounting last year to about \$115,000. The tickets are said to be used chiefly for business journeys, but also in the fine season largely for pleasure trips, as they enable the holder to run over the whole country for a comparatively trifling expenditure for the traveling of a two weeks' vacation. The hotel-keepers are said to complain that they reduce their patronage, as the travelers in a great many cases go home to stay over night when they have nothing to pay for the journey. From nearly all parts of the Kingdom commercial travelers and the like can go home for Sunday at least. The small towns sometimes complain that they are less frequently visited because the passengers, undeterred by the cost of the journey, prefer to go to places where there are greater attractions.

What the effect of these tickets is on the total passenger earnings it is excessively difficult to estimate, as they were introduced at the same time with another important change, namely, the introduction of book tickets at reduced rates; but such calculations as have been made generally result in the conclusion that they have not caused any loss.

The industrious and indispensable "Commercial and Financial Chronicle" makes some geographical collocations which we find it hard to understand. In its invaluable tables of railroad earnings the roads are assigned to groups, and as some of the railroads sprawl a good deal, it is of course impossible to make them quite logical. The Chronicle has a group headed "Pacific Roads," in which are usually only three—the Canadian Pacific, the Northern Pacific and the Rio Grande Western. As the Northern Pacific's nearest neighbor is the Great Northern, which extends quite to the Pacific, like the Northern Pacific, it is hard to see why one of them should be taken and the other left (to appear in the "Northwestern" group). Then the Atchison, Topeka & Santa Fe also manages to get to San Diego, and is certainly more of a Pacific road than the Rio Grande Western. It is true that these two roads are much more than Pacific roads, but that is true also of the Northern Pacific, which would be but a shadow of itself without its branches in Minnesota and Dakota. Again, the St. Joseph & Grand Island is put in the "Southwestern" group, the other lines of which are all south of St. Louis and Kansas City (barring the ends of some branches, perhaps). The whole of the Grand Island road is north of the latitude of Philadelphia, and in the territory covered by the Burlington, the Rock Island and the Union Pacific, which certainly are not southwestern. It is true that its earnings are so small that it doesn't make much difference where you put them, the total will be little affected. Another geographical puzzle is in the Chronicle's bank clearing house returns. Fargo and Sioux City are there listed among the "Pacific" cities, their nearest neighbor in the group being Spokane, 1,261 miles from Fargo, which is but 251 miles from St. Paul, while Sioux Falls is, as it were, a suburb of Chicago, and not 200 miles from Omaha.

A press dispatch from Berne, Feb. 20, says that the referendum has resulted in popular approval of the proposed state purchase of the railroads of Switzerland at a cost of about \$200,000,000. The vote was 384,146 in favor of to 177,130 against. The bill, now approved, was passed in October last by the National Council by a vote of 98 to 29. The Government is projecting a loan for the purchase. According to the last published table of the railroad mileage of the world Switzerland had 2,172 miles, being 13.5 miles per 100 square miles of territory and 7.3 miles per 10,000 of population. By the terms of the act now approved, three of the companies are to be taken over in 1903, and one, the Gotthard Railroad, in 1909. The charters of the companies which stipulate the price to be paid require in some cases several years' notice. The Federal council, in recommending this law, estimated that the net earnings of the road would produce an annual surplus of \$400,000 if the money to buy them with could be borrowed at 3½ per cent. At 3 per cent., by the same estimate, the surplus would be nearly \$900,000.

The student of Indian finance finds some difficulties in his way, if the subject is new to him. The currency is like other non-decimal currencies, but when we learn that a rupee at its best estate was worth but 44 cents, and that there are 12 annas in a rupee, it seems getting down rather fine to put 16 pies in an anna. Then the Indians have a decimal system of their own, and when the Occidental observes a sum of rupees stated at 4, 47, 52,525 it puzzles him. But the Indian calls 100,000 rupees a "lakh" of rupees, and a hundred times as much, or 10,000,000, a "crore" of rupees, so that the above sum is 4 crores, 47 lakhs, 52,525 rupees. When we add to this that the currency is silver and has declined in value for many years, but irregularly, and that some expenditures must be paid for in the equivalent of gold, it will be seen that the man who attempts to make comparisons extending over several years is not to be envied.

Press dispatches from Canada state that the Canada Atlantic, whose line extends from Parry Sound, on Georgian Bay, to Montreal, 380 miles, is preparing to enter into active competition for grain traffic from Chicago to Europe. There is an elevator at Parry Sound holding 1,250,000 bushels. The road has established a freight office in Chicago, and it will make traffic arrangements with boat lines running vessels of the largest size. The distance from Chicago to Parry Sound is 340 miles less than to Buffalo, and the railroad from Parry Sound to Montreal is 60 miles shorter than the New York Central from Buffalo to New York city.

The Measurement of Wind Pressures.

An interesting contribution toward the problem of determining the pressure on the various parts of any structure exposed to the wind, is to be found in a recent paper communicated to the Academy of Sci-

ence of St. Louis by Prof. Francis E. Nipher of Washington University. Starting with the formula $P=0.0025v^2$ in which P is the pressure lbs. per sq. ft. and v the wind velocity in miles per hour, and which, as shown by Newton, may be deduced by dynamical considerations as giving the pressure against an obstacle which wholly checks the wind, Prof. Nipher shows that this formula may be very accurately verified by experiments with a certain form of wind-pressure gauge. This is a tube having its open mouth directed to meet the wind and communicating from the other end with a suitable device for measuring the pressure of the air within it. Such a tube exposed to wind of known velocity or moved through still air at a known and uniform rate will develop a pressure very accurately corresponding to the above formula.

Another form of wind-pressure gauge is that in which a board of known area is placed square to the wind and held up against it by springs the compression of which shows the total force required to resist the wind's action. The results found in this way are greater, since what is measured in this case is the resultant of the compression on the face and the rarefaction on the back of the board, which latter has no effect in the case of the tube collector.

Either of these methods of measuring wind pressures supposes an obstacle of limited area exposed in an otherwise freely flowing current of air, and the results thus obtained can tell us little as to pressure against buildings or other large structures exposed to the wind. Since the air immediately against the surface of the building can have little velocity except parallel to that surface, a determination of the statical pressure at all points close against the building is what we need. The barometer naturally suggests itself, but this instrument does not give accurate indications when exposed to the wind. It can only register the pressure within its own air spaces, which will be greater than the true pressure of the surrounding air if the openings leading thereto happen to face the wind, or less in other cases, owing to the rarefaction on the lee side of an obstacle or the suction action of wind blowing across the mouth of an opening.

Prof. Nipher's aim has been to devise an apparatus which will give the true pressure of the air at any point without being affected by any changes of velocity or direction relative to the instrument itself. The result of his efforts is a "collector" formed of two thin circular discs 2½ inches in diameter, placed a small fraction of their diameter apart, and mounted on the end of a tube which communicates through a hole in the centre of one of them with the air space between them. This space is not left vacant but is filled by three or more layers of fine wire cloth which also project half an inch or more beyond the discs all round. The tube leads to the air space of a water column pressure gauge which being set at an inclination of 5 in 100 instead of vertical is quite sensitive to small changes of pressure. The meshes of the wire cloth afford free communication from the air outside the collector to the tube and pressure gauge for any changes of statical pressure, while they cut off and neutralize any effect of the motion of the air, so that the indications of the gauge are wholly unaffected by its position relative to the direction of the wind. The projection of the wire netting beyond the edges of the discs seems to be essential, as when it was cut off even with them an increase of pressure was shown if the discs were placed edgewise to the wind, and a decrease when turned more than 7½ degrees from its direction.

To test fully the action of the apparatus thus devised, an elaborate series of experiments has been carried out with the help of a car specially fitted up by the Illinois Central Railroad. A pressure board, 3 ft. by 4, was exposed above the roof of this car so mounted by hinges from a vertical axis turning on ball bearings that the moment of the total pressure of the wind upon it at any time could be read by means of a lever and spring balance within the car. The car was run daily for three weeks in a fast freight train between Champaign and Centralia so as to gain the effect of high wind velocities without waiting for windy weather. The speed in various experiments varied from 20 to 50 miles an hour.

The face of the pressure board being divided into 108 four-inch squares, two of the disc collectors were fastened, one on the front of the board and the other on the back, at the centre of each square successively. The pressure gauges connected with them were mounted within the car on a swinging arrangement to preserve the level and avoid shocks; and in this way, the board being placed at right angles to the direction of the wind relative to the car in motion, readings were obtained of the actual air pressure at the different points of both faces of the board, with simultaneous readings of the pressure on the board as a whole as shown by the spring balance. For any one point of the board these were found to be proportional, the air pressure readings at each point varying directly as the total pressure on the board. It was thus easy to reduce the air pressure readings for each square to an equivalent corresponding to a pressure of 120 lbs. on the whole board, or an average of 10 lbs. per square foot.

The average of the numerous determinations thus made for each square of the board was tabulated and the result shows the distribution of pressure over the faces of the board, ranging from 7.48 lbs. near the centre to 3.28 at the bottom edge and 4.30 at the top edge for the positive pressures on the front, and from 5.02 lbs. a little below the centre to 4.20 at the bottom and 3.58 at the top for the negative pressures on the back. The difference between the pressures at the top and bottom of the board is evidently due to the nearness of the roof of the car, and the dragging of the air immediately above it along with the train.

The correctness of the indications of this apparatus is well borne out by the fact that the sum of the air pressure obtained as above for each square, multiplied by the area of each gives 67 lbs. for the whole front side, and the negative pressures in the same way 52 lbs. for the whole back side, agreeing substantially with the total pressure of 120 lbs. as indicated by the spring balance. Enough has been done to show that the apparatus is capable of giving valuable results and we hope to hear of its application to the more practical problem of the measurement of the actual pressure on large surfaces during severe wind storms.

New Railroad Building in 1897.

(Continued from page 141.)

Virginia.	
Alberene.—From Warren to Boiling Springs...	2
Norfolk & Portsmouth Belt Line.—Belt line around these cities	2
Norfolk & Western.—Connection with the Coppenhagen Limestone quarry	1.5
Norfolk, Virginia Beach & Southern.—From Kempsville toward Munden Point	7
Total	12.5
West Virginia.	
Cheat Valley.—From Rowlesburg to Whetsell..	8
Glade Creek & Raleigh.—From Crow to Prince Holly River.—From Marpleton to Brown's Siding	3
Little Kanawha.—From Parkersburg to Elizabeth	5
Loup Creek & Deep Water.—From Deep Water to Robsons	26
Narrow Gage Road in Wythe Co. for Graham & Robinson, from their washers to iron mines	4.5
Porter's Creek & Gauley.—Along Porter's Creek toward Gauley River	3.5
West Virginia Southern.—Extension Ring Creek	5
Total	2
Wisconsin.	
Ashland, Siskiwit & Iron River.—From Iron River Junction to Flag River, 11 miles; from Cochran to Hoyt, 9 miles; from Siskiwit to Simpson, 5.3 miles; total	25.3
Bayfield Harbor & Great Western.—Bayfield to Raspberry	10
Bayfield Transfer.—From Bayfield along the harbor frontage	4.3
Chicago & Lake Superior.—From London to Cambridge	4.3
Chicago & Northwestern.—From Mountain to Wabeno	3.5
Fairchild & Northwestern.—An extension from Fairchild, 1 mile; from Greenwood, .5 mile; total	24
Kickapoo Valley & Northern.—From Readstown to Lafarge	1.5
Marshfield & Southeastern.—From Port Edwards to Nekoosa	12.5
Milwaukee & Superior.—From Sussex to North Lake	4
Minneapolis, St. Paul & Ashland.—Extension to Duluth, South Shore & Atlantic	9
Washburn, Bayfield & Iron River.—On line from Washburn toward Iron River and from Bayfield	20
Total	28
CANADA.	
Asbestos & Danville.—From Danville, Quebec, to Asbestos	142.1
Atlantic & Lake Superior.—From Caplin to Paspebiac	4.75
Canada Atlantic.—From Lacolle Junction to Vermont State line	20
Canadian Pacific.—Columbia & Kootenay extension from Slocan Junction to Slocan Lake, 32 miles; Crow Nest Pass extension from Lethbridge west toward Nelson, 80 miles; Montreal & Ottawa extension from Alfred toward Ottawa, 42 miles; total	5.5
Coast Railway of Nova Scotia.—From Belleville to East Pubnico	151
Columbia & Western.—From Trail to West Robson	17.2
Drummond County.—From Moose Park to Chaudiere	21.5
East Richelieu Valley.—From Iversville to Henryville	42
Irondale, Bancroft & Ottawa.—Extension to Bancroft	12
Lake Manitoba Railway & Canal Co.—Extension to Winnipegosis	5
L'Epiphaïne & L'Assomption.—An extension from L'Assomption	23
Montfort Colonization.—From Brunet to Arundel	4
Ottawa & New York.—From Ottawa to Cornwall	12
Phillipsburg Railroad & Quarry.—From main line to wharf on Missisquoi Bay	52
United Counties.—From Iversville to Island Thomas	7
Total	22
Total	395.65

MEXICO.

Coahuila & Zacatecas.—From Saltillo toward Concepcion del Oro	42.5
Mexican National.—From Patzcuaro toward Uruapan	15
Mexico, Cuernavaca & Pacific.—From Tres Marias to Cuernavaca 28.58 miles; from Puente de Ixtla to Los Amates 24.86 miles; total	53.44
Mexico, Hidalgo & Northeast.—From Sototlan to Tortugas	7.46
Michoacan & Pacific.—From Tuxpan to Zitacuaro	27
Rio Grande, Sierra Madre & Pacific.—From Ciudad Juarez to Terrazas	156
Toluca & Tenango.—From Mexicalcingo to Tenango	16
Total	317.4

TECHNICAL.

Manufacturing and Business.

The Sargent Co., of Chicago, furnished the steel castings and gears for locomotives for the Snow & Ice Transportation Co. for use in Alaska. The order amounted to something over a car load.

Sealed proposals will be received until March 8 at the office of the Supervising Architect, Washington, D. C., for furnishing all the labor and materials and fixing in place, complete, the boiler plant, low pressure exhaust steam heating mechanical ventilating apparatus, hot and cold water supply system, etc., and fire pump required for the United States post-office, court house and custom house buildings at Milwaukee, Wis.

L. C. Chase & Co., 129 Washington Street, Boston, Mass., the first and the largest makers of mohair car plush in America and the only makers of frieze plush in this country, reports a steadily increasing business. Among the large orders received during the last six months was one from the Pullman Palace Car Co., which included the necessary materials for upholstering all the furniture in the observation room of the Mexican Presidential train.

The National Water Tube Boiler Co. of New Brunswick, N. J., has gone into the hands of a Receiver, Henry G. Parker, Cashier of the National Bank of New Jersey, having been appointed, upon application of the stockholders. The corporation was formed in 1890 with a capital stock of \$200,000. The officers are: Matthew Suydam, President; John C. Evans, Treasurer; Edward Tindell, Secretary; C. A. Schenck, General Manager.

The Sherwood Car Fender Co. of Jersey City, N. J., has been incorporated with a capital stock of \$400,000, by Everett Brown, Penn Yan, N. Y.; Edward G. Maturin, East Orange, N. J.; Allen C. Scism, Charles H. Bonner, New York, and Judson J. Curtis and Earl Sherwood, Honesdale, Pa.

The Case Mfg. Co. of Columbus, O., has received an order from the government railroads of New South Wales for two 30-ton electric cranes to be shipped to Sydney.

Owing to the increase of its business the Buckeye Malleable Iron & Coupler Co., Columbus, O., has decided to put up an additional foundry 250x50ft. This will increase the capacity for car couplers to 8,000 a month.

Some of our contemporaries have printed reports to the effect that the Renova shops of the Pennsylvania have been ordered to equip from 50 to 150 cars per month with Janney couplers. The following is an extract from a letter received on this subject from the McConway & Torley Co.: "We have no information on the subject you write about. The Pennsylvania Railroad might give a dozen such orders but a difference of 15 to 150 cars a month would scarcely be noticed in their orders for couplers as they usually carry a large stock and might draw on that for several months before we knew anything about it."

Mr. W. H. Hooper has been appointed general agent of the Safety Car Heating & Lighting Co. in Chicago, succeeding George N. Terry, resigned. Mr. Hooper had been located in the St. Louis office in the capacity of engineer.

At the annual meeting of the stockholders of the Lehigh Coal & Navigation Co., held at Philadelphia, Feb. 21, Mr. James May Duane was elected a director, succeeding Mr. C. Tower, Jr.

The Chicago Pneumatic Tool Co. of New York received during the month of January cable orders from Europe for 107 machines. On the first of February they received an order from Russia for 19 machines from a locomotive works which purchased 12 machines from them some time ago. The company holds that this is proof that their machines give perfect satisfaction. They state that their customers in Europe say that beside the great saving in labor the work is far superior to hand work.

Iron and Steel.

The Columbus Forge & Iron Co. has been incorporated with a capital stock of \$20,000, to carry on a general forging business, by David Buel, Wm. W. Franklin and W. D. Brickell.

The American Steel Casting Co. is improving its plant at Sharon, Pa., the plans already drawn pro-

viding for a brick power house 40x80 ft. There will be new engines, new electric cranes, etc.

At a recent meeting of the Board of Directors of the Ohio Steel Co., Youngstown, O., it was decided to at once complete the finishing department of the plant for the manufacture of rails.

On Feb. 19 the plant of the Excelsior Iron Works, Chicago, was damaged by fire and water, the loss being about \$7,000 to the plant and \$2,000 to the building. When the fire was discovered at 1 p. m., 200 men were in the building, but all escaped unhurt, the damage being confined to the upper floors.

The Central Iron & Steel Works, Harrisburg, Pa., have received an order from the William Cramp & Sons' Ship & Engine Building Co., for plates for ships for the West Indian trade.

The North Cornwall (Pa.) furnaces, which have been leased by the Lackawanna Iron & Steel Co., will be put in blast soon, after several years idleness.

The high wind of Feb. 16 blew down a large 100-ft. iron stack and crushed in a portion of the roof of the 10-inch mill of the Pennsylvania Belt & Nut Works, Lebanon, Pa. The stack was in course of erection. SCRAP

New Stations and Shops.

The Baltimore & Ohio has lately completed a new pier in Philadelphia. It is 557 ft. long and 140 ft. wide. It has deep water on both sides and an ample shed. This pier more than doubles the freight facilities of the Baltimore & Ohio in Philadelphia.

The Philadelphia & Reading (Atlantic City) Railroad is to build a new ferry house at the foot of Chestnut street, Philadelphia. It will have a frontage of 151 ft. on Delaware avenue and of 249 ft. on the river. The building will be of steel, sheathed with corrugated iron. The main waiting room will be 56x59 ft. The foundations are now being put in and work on the building proper will be begun about April 1.

Minneapolis papers report that the foundations for the new station of the Chicago, Milwaukee & St. Paul in that city are now completed and that the contract for the erection of the superstructure, exclusive of heating and plumbing, has been let to the H. N. Leighton Co. It is said that the superstructure will cost about \$130,000, the first story to be built of granite, and that work on it will commence March 1.

A Locomotive for Columbia University.

For some time we have been aware of a movement on hand to secure the locomotive "Columbia" for the mechanical laboratory of Columbia University. We are now informed that the Baldwin Locomotive Works have offered to give this locomotive (without the tender) to the University, it being understood that the University will provide the equipment necessary for exhaustive locomotive tests. So far as we learn the offer has not yet been formally accepted, as perhaps the necessary money for the additional equipment has not been entirely provided. As to this, however, we are not yet precisely informed. It is unnecessary to say that such an addition to the engineering apparatus of the University would be of great value, not only to that institution and its students, but to the railroad world. Hardly any one thing connected with Purdue University has done so much to make that institution well known to an important public, and to make the work there of high scientific service, as the installation of a full size road engine in its mechanical laboratory. A movement has been on foot some time to provide similar apparatus for Cornell, which movement, we hope, will also be speedily successful.

The Crewe Locomotive Works.

From a report which has just been issued it appears that during the year 1897 there were as many as 751 accidents at the Crewe works of the London & North Western. Three of these proved fatal. The men have their Mutual Insurance Society, to which the company contributes. Some very important and interesting works are in active progress at Crewe, the cost being estimated at something like \$2,500,000. When they are completed the six lines of railroad which converge at that place will be so rearranged on a plot of ground one-half mile wide and two and one-half miles in area that through and local traffic will be separated, as well as goods and passengers. This will dispense with a large amount of shunting, of which a great deal has to be carried on over the main lines. The works involve some half a mile or more of tunneling, most of which is cut and cover, and some of it through made ground. The mileage of sidings will be increased considerably. The Crewe station is to be altered to such an extent that whereas it now covers only 93 acres it will when altered cover 223 acres.

At the Crewe workshops electricity is largely employed for working cranes, the motors for which have field magnets of the Manchester type, and Pacinotti armatures. With a 30-ton crane in the erecting shop, used for lifting locomotives, the load is lifted at a speed of 2 ft. 6 in. per minute, at an expenditure of 70 amperes at 120 volts pressure. All the dynamos employed at Crewe have been made in the workshops there, but some of the engines for driving them have been made by Willans & Robinson, and by Bumsted & Chandler.

Chicago Track Elevation.

Mr. James Dun, chief engineer of the Atchison, Topeka & Santa Fe, has been selected by the roads involved in the work of elevating the Sixteenth Street Crossing, Chicago, to take direct charge of the track elevation at this point. The work will be commenced early in the Spring.

Malleable Castings for Locomotives.

We have lately recorded the order taken by the Rogers Locomotive Works for fifteen locomotives for the International & Great Northern Railroad. On these a very unusual amount of malleable iron is specified, aggregating about 2,400 lbs. each. The builders tell us that they have had occasional calls for most of the parts named, but never before for so much in any one engine. The malleable castings to be used on the locomotives are front drawhead, branch pipe, exhaust pipes, cylinder head casings and steam chest casings. On the tenders the parts specified in malleable iron are truck boxes, frame columns, center pins and plates, side bearings, spring seats and chafing brackets. The only object, of course, in the use of so much malleable is to reduce the weight.

M. C. B. Standards and Recommended Practice.

The Committee on the Supervision of Standards and Recommended Practice of the Association will be glad to receive suggestions in reference to any modifications of the established standards and recommended practices of the Association as are justified by experience in their use.

A circular listing standards and giving suggestions received has been issued, replies to be sent to A. M. Waitt, General Master Car Builder, L. S. & M. S. R'y, Cleveland, O., not later than March 15, 1898. The committee consists of Messrs. A. M. Waitt, Chairman; G. L. Potter and William Apps.

Pig Iron Production in January.

The "Iron Age" in its monthly report on the production of pig iron states that on Feb. 1 there were 184 furnaces in blast, with a weekly capacity of 228,338 gross tons, against 188 furnaces in blast Jan. 1, with a weekly capacity of 226,608 gross tons, and against 154 furnaces in blast Feb. 1, 1897, with a weekly capacity of 162,959 gross tons. The amount of stocks, sold and unsold, Feb. 1, were 776,284 tons, against 736,366 tons on Jan. 1.

San Pedro Harbor.

Bids for building the breakwater at San Pedro, Cal., were opened at San Francisco, Feb. 10, at the office of Major Davis, Corps of Engineers, U. S. A. There were 17 bids, which ranged from \$4,595,516 down to \$1,303,199. The highest bid was that of the National Contracting Co., New York, the lowest that of Heldmeyer & Neu of Chicago. The estimate of the board which investigated this subject at great length a number of months ago (Admiral Walker, Mr. Rodgers, Mr. Morison, Prof. Burr and Mr. Morgan) was that the work would cost \$2,523,293, to which they added a percentage for engineering contingencies, and the act authorizes a harbor costing \$2,900,000. There is but one bid exceeding that sum, and that is so far above the next lower bid that it should be left out entirely as being erratic.

A New Steamer for Chesapeake Bay.

The Harlan & Hollingsworth Co., Wilmington, Del., is building for the Baltimore Steam Packet Co. a steamer to ply between Baltimore and Norfolk, Portsmouth and Old Point Comfort. She will be fitted with twin screw propellers, having double sets of triple expansion engines and four Scotch boilers. Her dimensions will be 245 ft. between perpendiculars, 38 ft. breadth of beam on deck and 43 ft. in breadth over guards, with a depth of hold of 15 ft.; her hull being of steel throughout. She is built to carry both freight and passengers. Nearly the whole of the main deck will be available for freight in addition to a large hold forward of boilers. There will be a lobby, a small saloon aft on main deck, and her main saloon will run nearly the whole length of the saloon deck. She will also have a gallery deck which will contain about 20 state rooms and a smoking room. There will be 70 state rooms in all. The dining room and main deck saloon will be of quartered oak, the main saloon of ash and the gallery saloon of light maple. She will be able to carry 250 passengers each trip. The steering gear will be controlled by steam and she will have steam windlass and capstan. The elevators for handling the cargo will be run by double engines. She will be lighted throughout by electricity and will be fitted with electric bells. It is expected that the boat will be ready for commission by September 1st.

THE SCRAP HEAP.**Notes.**

The freight house of the Philadelphia & Reading, at Front and Noble streets, Philadelphia, was burned down on Feb. 16. Loss, about \$100,000 on merchandise and \$20,000 on building.

At Boston last week 10 trainmen of the New England road were arrested on the charge of obtaining money by false pretenses. In collusion with a time clerk, these men had received sums in excess of the wages they had earned.

The freight agent of a fast freight line at Milwaukee has been forbidden to use the privileges of the floor of the Chamber of Commerce of that city because his road has neglected for about a month to pay a claim of \$817 which it is said to owe to a member of the Chamber. The claim is for damage on freight from Liverpool.

The Wabash, which for several months has run passenger trains through to and from Buffalo over the Grand Trunk, will soon begin running freight trains also. The distance from Chicago to Buffalo over the Wabash and the Grand Trunk by way of Fort Erie is only 512 miles, 11 miles shorter than by the Nickel Plate, the next shortest line.

Accidents to trainmen in tunnels due to inhalation of gases have been somewhat frequent lately, and the superintendent of one road has issued a general order to the effect that at a certain tunnel freight trains must not be run through unless the conductor and engineman are satisfied that they can maintain a speed of at least 12 miles an hour. If they are not satisfied of this they must divide the train and make two trips.

The Adams Express Company, which is not a corporation, has distributed to shareholders a cash dividend of \$100 a share in order to reduce the capital of the company and "avoid excessive and burdensome taxation in certain Western states." Bonds will be issued for an amount equal to the payments made under this arrangement, the bonds to be for 50 years, payable in gold, with interest at four per cent. They will be secured by a deed of trust to the Mercantile Trust Company.

The Chicago, Milwaukee & St. Paul continues, with persistency and success, its missionary work for the salvation of the hogs of Iowa and Minnesota. Mr. Baumgartner, the specialist who is employed by the railroad company, has lately administered his cholera treatment to large herds at Faribault and Warsaw, Minn., curing about 90 per cent. of the animals in each case. Mr. Baumgartner has arranged with the Minnesota State Board of Health and the Minnesota Farmers' Institute for an official test of his treatment for hog cholera.

Some Electrical Matters in England.

While electric lighting enterprise has made satisfactory progress, the advance in electric traction is slow, and in this field England is still greatly behind other countries. The total amount of loans for electric lighting purposes authorized to be raised by municipalities is, at present three and a half millions sterling. The amount of private capital invested in electric lighting companies is about six and a half millions sterling. The number of incandescent lamps in use in the United Kingdom for public and private lighting is not far short of five millions. It is worthy of note that a very considerable portion of this capital is a remunerative investment. In the provinces more than two-thirds of all the electric supply business is in the hands of the municipalities, while in London all but about 6 per cent. of the electric lighting is carried on by companies.

There are 950 electric tramcar lines in the United States, with a total length of 14,000 miles of track. In the United Kingdom there are 80 miles actually in operation and 75 miles under construction. Applications have now been lodged with the Light Railway Commissioners for powers to construct 123 miles of railway to be worked by electricity. In Leeds, Dublin and Bristol electric tram lines are now in operation, and in many other towns horse car lines are being converted into electric lines. There can be no question, however, that the interpretation which has been put upon the Purchase Clauses of the Tramway Act has retarded private enterprise in this direction, and has thrown the responsibility for progress upon the municipalities, who have rarely had enterprise enough to act. One would not, in the ordinary course of things, look to Hungary for a lead in the matter of street locomotion, but I may state that in Budapest the last horse tramcar has lately been taken off the lines, and the whole 70 miles of urban tram lines in that city are now worked by electricity.—"Transport."

Siberian Versus United States Wheat.

Within the present decade the exportation of flour from the United States to China and Japan has assumed proportions that give encouragement to the industry, while there seem to be great possibilities in that line in the near future. The construction of the Siberian Railroad was thought by many to herald the advent of a dangerous rival. Of the country penetrated by the great railroad or tributary thereto, less than 2 per cent. of the productive land within reach of the railroad is devoted to the growing of wheat. In the extreme south and southeast the cultivation of wheat assumes the first place; here, from one-third to one-half of all the lands under crops are sown to wheat. The outlet for the wheat-producing country is found in the great inland seas, while the market is near by. Spring wheat predominates in the extreme south, while in the east none else is sown. The chief centres for Spring wheat are in the south and south-eastern provinces, where transportation to the sea is easy, while Winter wheat is grown chiefly in provinces in the southwest, of which Kiev is the centre. The country has such immense distances and insufficient communication that no equalization of surplus or prices seems possible. The danger that a surplus from any of the northern provinces will materially affect the markets of the world is obviously remote. The new railroad will have served its purpose well if within a generation these widely separated provinces have organized their markets so as to supply the ever-pressing local need. The wheat grown in the Altai, the steppe regions and the southern parts of the Tobolsk Government now goes to European Russia, or, strictly speaking, to another part of Siberia, yet fails to supply the demand. The railroad will but facilitate these meager shipments. I am of the opinion that the extension of the Siberian Railroad will not be followed by an increase in the exportation of Russian wheat: (1) Because the wheat fields in

Siberia are not numerous or extensive, and where wheat is grown in the largest quantities the railway does not penetrate; (2) because freight by rail is too expensive to permit the carrying of wheat from the interior of Siberia to the frontier, thus enabling new fields to develop and materially affecting the world's market; (3) because the surplus in western Siberia goes only to the rural districts to supply the deficit of that country; (4) because that portion of the country suited to the production of wheat has long been under cultivation and is occupied by small holdings. Hence, it is not likely that there will be material change in the crops grown, and no increase in the surplus can be expected.—"Consular Reports."

English Light Railroads.

A point of importance in connection with the development of light electric railroads and tramways in England, is calling for attention there. It is a matter of special interest to those engaged in popularizing electric traction. Where light railroads have to pass through districts under the control of town and district councils or other municipal bodies, the consent of such bodies has to be obtained, and so onerous are some of the conditions imposed, that about the only hope of getting anything like a reasonable return on the capital expenditure is to secure the concessions for a long lease. Fourteen or twenty-one years is not long enough, when everything is taken into account, and there is a growing feeling that long leases should be granted.

An Underground Railroad for Brighton.

Proposals for English deep level electric railroads are not confined to London, for it is proposed to put down such a line at Brighton the celebrated holiday resort on the South Coast, for the purpose of affording a rapid means of conveying excursionists from the London, Brighton & South Coast station to a point near the beach, with openings under the parade communicating with the beach. The total length will be about three-quarters of a mile, and the capital outlay is estimated at about \$800,000. A 4 cent fare is proposed.

Railroad Projects in Nicaragua.

Consul Wiesike writes from Managua, under date of Jan. 26, 1898, that a newspaper has published a statement to the effect that the National Railroad of Nicaragua would be sold to a syndicate of English capitalists, who would pay the national debt of Nicaragua to the English bondholders, and, above this, would pay the sum of \$1,500,000 silver to the Government. Mr. Wiesike says that he called on Senor Calderon, the Minister of Interior Relations, to learn the truth of the report, and was informed by him that such a proposition had been made to the Nicaraguan Government by Mr. Louis Wichmann, the agent of the Atlas Steamship Company. The Minister told Mr. Wiesike that the bargain had not yet been closed, but that President Zelaya was inclined to accept the offer made, with some modifications, and had so cabled Mr. Wichmann in London. The Atlas Steamship Company, it will be remembered, has a contract with the Nicaraguan Government to construct a railroad from Silico Lagoon to the San Juan River.

Consul Sorsby sends from San Juan del Norte, under date of Jan. 25, 1898, the following translation of a part of President Zelaya's message to Congress relating to this concession:

"The contract with the English Company Atlas relative to the construction of a railroad from the Silico Lagoon to the San Juan River to facilitate the navigation of the same is being executed, and the contracting parties have made the deposit of guaranty. For want of proper knowledge of the terms of the concession, it is said that the concession conflicts with that given previously to the canal company to cross our isthmus. Nothing is more untrue. The contract with the first association is perfectly compatible with the second, and the greatest care has been observed in the said contract in an express manner to protect the rights of the canal company."

New Ferryboat for New York.

The Pennsylvania has closed a contract with Delaware River Iron Shipbuilding & Engine Works for a new ferry boat to ply between New York and Jersey City. The new vessel will cost \$200,000, will have double decks and will be 206 ft. long. It is expected to have the boat in service this fall.

Chicago Harbor.

The Congressional Committee on Rivers and Harbors arrived in Chicago on Feb. 21, for the purpose of inspecting the Chicago and Calumet rivers and the Drainage Canal, in order to decide whether the memorial praying for a 20-ft. channel for the Chicago River and for an appropriation of \$400,000 for the improvement of that river should be granted. The committee was accompanied by several members of the Illinois delegation, and during its stay was entertained by the Chicago River Improvement Association. The programme for the three days, Feb. 21-23, included a trip over both branches of the Chicago River, which was made on Monday in spite of a severe snowstorm; on Tuesday the Calumet River was inspected, and on Wednesday the Drainage Canal, the party leaving Wednesday night for Benton Harbor, Mich., to inspect the harbor there.

Iron Ore Output for 1898.

The producers of old range Bessemer ores have agreed upon their allotment of production for the current season, providing for an output of 6,000,000 gross tons, an advance of 1,000,000 tons over the amount produced last year. Attempts to include the Mesaba mines in the pool were unsuccessful. The prices agreed upon for 1898 are based upon standard Gogebic ore, produced in large amount by the Norrie mine. An advance of 15c. a ton was made over last year's price of \$2.65, making the figure for 1898 \$2.80 a ton for standard Gogebic. According to the new scale the Minnesota Bessemer will range above \$3, the fancy Bessemer will sell up to \$3.68. Non-Bessemer will take their chances in the open market. Fayal ore, the standard of the Mesaba district, sold down to \$2.10 a ton last year, and it is expected that the prices for it will be little better this season, and that the Mesaba mines will do well if they make sales on the basis of \$2.25 a ton for Fayal. The outlook for independent mine owners of the Mesaba and for many old range properties producing non-Bessemer ores is discouraging for any but small profits for this year. The 1898 schedule is not encouraging

to vessel owners, as it means in all probability the continuation of 1897 freight rates. Rail freight rates are likely to remain unchanged unless owners of independent mines in Minnesota succeed in securing a reduction over the Duluth, Missabe & Northern and the Duluth & Iron Range railroads, through their recent appeal to the Minnesota Railway & Warehouse Commission. The prospect now is that navigation will open unusually early this year, which will be a strong point against any increase of lake freights.—Condensed from the Chicago Times-Herald.

Our Consumption of Pig Iron.

For a great many years we have been in the habit of estimating the annual consumption of pig iron in the United States, an exact computation not being possible. In doing this we have made due allowance for imports, exports, and stock on hand and unsold. We estimated the consumption of pig iron in the eight years from 1889 to 1896 as follows, with which we place side by side the production in the same years.

Years.	Actual production. Gross tons.	Estimated consumption. Gross tons.
1889.....	7,603,642	7,755,093
1890.....	9,202,703	8,943,338
1891.....	8,279,870	8,366,728
1892.....	9,157,000	9,303,315
1893.....	7,124,502	6,982,607
1894.....	6,657,388	6,694,478
1895.....	9,446,308	9,628,572
1896.....	8,653,127	8,275,774

It is a little too soon to fully estimate our consumption of pig iron in 1897, the import and export statistics of pig iron for the whole year not being as yet available, but a very close approximation to actual results is possible. We produced in that year 9,652,680 gross tons and imported say 18,000 tons. The imports in the first eleven months were 16,327 tons. At the beginning of the year there were on the market 847,686 tons of pig iron. The total supply for the year was, therefore, approximately, 10,518,366 tons. Of this total supply we exported about 260,000 tons. The actual exports in the first eleven months were 236,502 tons. There were on the market at the close of the year 874,978 tons. Deducting these two items from the total supply we have 9,383,388 tons as the approximate consumption of the year. This quantity is about 245,000 tons less than the consumption of 1895 and not very much in excess of the consumption of 1892. It will be observed that we are not consuming as much pig iron as has been industriously represented.—Bulletin of the Iron and Steel Association.

One Way of Looking at It.

The official announcement that the General Electric Company has been entrusted with the order for thirty-two electric locomotives for the Central London Underground Railroad confirms the rumor to that effect which has gone about for some time past. This has come as an unpleasant intimation to locomotive manufacturers on this side, but side by side with it is the confession of an American that not only is there no money in this line of business, but actual loss. It is believed that the big electrical firms are forcing the smaller firms to the wall to destroy competition.—"Transport."

Honduras.

Mr. C. Coit, heretofore of the office of Auditor of Freight Accounts of the New York Central & Hudson River, with office in New York, has been appointed cashier and paymaster of the Honduras Railroad Syndicate. Mr. Coit left New York for Honduras Feb. 21. His headquarters will be at Puerto Cortez.

Wheat Crop of India, 1897-98.

India being one of the largest competitors of the United States in wheat in the markets of the United Kingdom and the Continent of Europe, it will be a matter of interest to know the prospects of the growing crop. To show the importance of the wheat crop of India in the markets of England and the Continent, the quantities exported to these countries, during the past ten years, are given as follows, in cwt. of 112 pounds each:

Year.	Quantity. Cwts.
1887-88	13,538,169
1888-89	17,616,081
1889-90	13,799,224
1890-91	14,320,496
1891-92	30,305,425
1892-93	14,993,453
1893-94	12,156,551
1894-95	6,887,791
1895-96	10,002,912
1896-97	1,910,553

In addition to the above, the exports of wheat flour were 74,114,000 pounds in 1895-96, and 67,177,000 pounds in 1896-97.

It will be seen that the exports have not expanded, but, during the past ten years, have largely contracted.

In Northern India the prospects of the wheat harvest are, on the whole, excellent, the area sown in the Punjab and Northwest Provinces and Oudh being well up to the average, while the crop is coming along under favorable conditions. In Sind, also, there is a prospect of a large crop, the area sown having greatly exceeded the average.

Unfortunately, this is not the case with the other great wheat-growing regions. In Bombay, Berar and the Central Provinces the desire of the people to secure the early replenishment of their exhausted supplies of food grains and the high price of wheat seed led to the extensive sowing of lands with millets, which in an ordinary season would have been sown with wheat. The prospects of the crop in Bombay and Berar are also not particularly good; in the Central Provinces, however, a fair crop may be expected. In the tracts which were affected by the famine (the Deccan and Carnatic) the area under wheat is greatly below the average, jowar and other millets having been sown instead.

The area sown in Punjab, the Northwest Provinces and Oudh, the large wheat-producing provinces, is reported well up to the average and the prospects are favorable for a good crop, though the area sown in other provinces is below the average and the prospects are not so favorable.

With the large crop of rice and millets harvested, a large quantity of wheat will be released, and the quantity available for export, if the season continues favorable, will probably reach the average of the past ten years, from 12,000,000 to 14,000,000 cwt. (22,400,000 to 28,166,667 bushels). The crop will be harvested in February, and ready for export in March.—"Consular Reports."

LOCOMOTIVE BUILDING.

The Brainard & Northern Minnesota is in the market for one switching locomotive.

It is again reported that the Wheeling & Lake Erie is in the market for some new engines.

The Rogers Locomotive Co., of Paterson, N. J., is building one locomotive for the Illinois Central.

The Baldwin Locomotive Works are building three locomotives for the Sorocabana & Ituaia Railroad.

The Chicago Great Western is asking bids on two sample locomotives, one compound and one simple, and on five boilers.

While it is not officially announced, we have reason to believe that the Canadian Pacific is in the market for more locomotives.

The Erie & Central New York wants a 50-ton locomotive and is ready to receive bids. N. A. Bundy of Cortland, N. Y., is General Manager.

The Peoria & Pekin Union has placed an order with the Brooks Locomotive Works for two 6-wheel switching engines with 18x24-in. cylinders and 52-in. driving wheels.

The order for the two switching locomotives for the Kansas City Belt, mentioned in recent issues, has been placed with the Baldwin Locomotive Works. These engines will have 19 x 26 in. cylinders, and weigh 110,000 lbs.

We are informed by the General Manager of the Indiana, Illinois & Iowa that there is no foundation for the rumor that that road is in the market for new locomotives, and that it is not in the market for new power or equipment.

The Hankoku Railroad of Japan has sent out specifications for two American type passenger engines with 16 x 24 in. cylinders, and three six-wheel coupled freight engines with 16½ x 24 in. cylinders. The locomotives will have steel fireboxes and brass tubes.

The Baldwin Locomotive Works has received an order for 14 engines for the Russian State railroads for shipment to Novorossisk. They are also building 20 locomotives for the Ribinsk-Moscow-Windau Railway Co., to be shipped to Riga. The specifications are substantially the same as those of the Vaulchain compound consolidation engines heretofore built by the Baldwin Locomotive Works for Russian roads.

The Indianapolis Union has placed the order for the two six-wheeled switching locomotives, referred to in our last issue, with the Baldwin Locomotive Works. They will have 19 x 24 in. cylinders; 50 in. driving wheels; boiler, straight top, radical stayed, 60 in. in diameter, of homogeneous steel. Carbon make firebox, 84 in. long, 32½ in. wide; wheel base, 11 ft.; boiler pressure, 180 lbs.; tender capacity, 3,500 gals. of water and 8,000 lbs. of coal. The engines will weigh, in working order, about 110,000 lbs. on the drivers, and be equipped with Coale mufflers, Richardson balanced side valves, U. S. Metallic packing, A. French Spring Co.'s springs, Detroit lubricators, Monitor injectors, Janney couplers, M. M. Buck Mfg. Co.'s headlights, Westinghouse air-brakes and Coffin toughened steel for piston rods and driving axles.

CAR BUILDING.

The Erie Car Works are building three cars for the Nichols Chemical Co.

The Chicago, Indianapolis & Louisville is preparing specifications for 250 flat and 50 stock cars.

The Chicago, Indianapolis & Louisville is in the market for from 200 to 250 box cars, orders for which will be placed soon.

The Western New York & Pennsylvania is not building cars for outside parties, as stated by a contemporary last week.

The Chicago, Rock Island & Pacific is in the market for some new furniture cars which will soon be ordered, but the contract had not been let up to the time of going to press.

The St. Charles Car Co. is reported to have orders for two coaches for the St. Louis Terminal, two coaches for the St. Louis, Peoria & Northern and a private car for the Iowa Central.

The rumor that the Chicago & Northwestern is in the market for cars is erroneous, the report having arisen from the fact that the drafting department of that road has been engaged on the plans for cars for the Union Pacific.

The Mobile & Birmingham has ordered fifty 60,000-lb. box cars from the Illinois Car & Equipment Co. These cars will be equipped with Janney couplers and air brakes and will be built at the Anniston, Ala., shops of the car company.

During the past week it has been reported that the Northwestern Elevated of Chicago was in the market for cars. These rumors are denied officially at the offices of the road and it is stated that it will be some time before equipment will be ordered, and that the road is not now in the market.

The Goodwin Car Co. has placed the order for the 20 Goodwin cars with the Elmira Bridge Co. of Elmira, N. Y., to be delivered April 27. The specifications were given in this column Feb. 4. The Troy Malleable Iron Co., of Troy, N. Y., will furnish all the general malleable casting for the cars.

The Illinois Central has just put in service on its live stock trains between Dubuque and Chicago six new cabooses containing sleeping accommodations for drovers. The berths are convertible into seats in the daytime and each car has accommodations for 12 passengers at night or 24 in the daytime. Nearly all the stock cars of the Illinois Central now have air brakes, and these cabooses have air brakes, with conductors' valves.

In our last issue we referred to an order for 50 flat cars for the Kansas City, Fort Scott & Memphis. The contract has been given to the Illinois Car & Equipment Co., and the cars will be built at the Anniston shops. They will have, in addition to the equipment mentioned, American draft rigging, Scott bolster springs, French draft springs and Hewitt brasses. The cars are for April delivery.

The Illinois Car & Equipment Co. is building 250 box cars for the Rio Grande Western and has a 60-day option on 150 more. They will be 37 ft. 8 in. long, with swing motion trucks, Westinghouse air brakes, Kewanee brake beams, Detroit springs, Chicago roofs, Sams automatic couplers, Chicago grain doors, Dunham side and end door fixtures, Sebring door locks, American draft rigging and malleable journal boxes with Fletcher lids. The cars will be built at the Chicago works, and 100 will be delivered in April and 150 in May and June.

BRIDGE BUILDING.

ADAMS, MASS.—Plans have been prepared for a plate girder bridge at State street, to cross the Hoosac River. John H. Emigh, Commissioner of Public Works.

ALTON, ILL.—Press reports state that a viaduct will be built over the tracks of the Chicago & Alton. Mayor Bruegeman and W. T. Norton are members of a committee appointed to advise in the matter.

AMELIASBURY, ONT.—A bridge will be built between Huff's Island and Massassaga Point, to cost about \$2,000.

BEATRICE, NEB.—Bids are wanted March 2 for building bridges in Gage County. J. M. Jones, Chairman Commissioners.

COLUMBUS, IND.—Press reports state that a new bridge will be built over Flat Rock River, Columbus, on the Louisville Division of the Pittsburg, Cincinnati, Chicago & St. Louis.

COLUMBUS, O.—A petition has been made for a bridge over Little Walnut Creek in Madison Township, to cost \$9,000, one over Big Walnut Creek on Broad street, just east of this city, to cost \$25,000, and the other over the same creek on Groveport pike to cost \$25,000, and one over Alum Creek on Main street to cost \$50,000.

DETROIT, MICH.—In the extensions contemplated by the Rapid Railway Co. to Port Huron and St. Clair Flats (see "Railroad Gazette" Feb. 4, page 89) a bridge will be necessary across Lake St. Clair. The distance across the lake at the point of crossing is about 6 miles. The bridge will be a wood trestle. It will cost about \$400,000. It is the intention where the water is shallow to build an embankment for the roadbed, and at the Baltimore channel a draw, which will have a 125-foot opening on each side.

FOREST CITY, PA.—The question of a county bridge over the Lackawanna River is being discussed by the citizens. The following gentlemen are promoting the project: James McKinney, John R. Budd, W. H. Bates, Benjamin Maxey, E. F. Ames. Forest City is in Susquehanna County. L. D. Benson, surveyor, E. G. Ball, Clerk, Montrose.

LACARNE, O.—A new bridge will be built at Lacarne, Ottawa County.

LAMOURE, N. D.—Press reports state that contracts will probably be let in April for building bridges over Cottonwood Creek and Maple Creek. Charles Alister, County Auditor.

LEXINGTON, MO.—A bill is now pending in Congress to extend the time when work must be commenced on the bridge over the Missouri River at Lexington.

LOUISVILLE, KY.—Press reports state that a bridge will be built on Seventh street, north of Spring street.

MARQUETTE, MICH.—At a recent meeting of the Portage Township Board it was voted to construct a steel bridge across Pilgrim River at a cost of about \$2,500.

MARYSVILLE, PA.—It is stated that an overhead bridge will be built across the railroad tracks at Marysville, Perry County, this year.

NEWBURGH, N. Y.—A bill passed the Senate providing for a bridge over Chambers Creek in Newburgh.

NEWPORT NEWS, VA.—Bridges will probably be built in the near future over the tracks of the Chesapeake & Ohio at 25th Street and 34th Street, to cost about \$25,000 each.

PENSACOLA, FLA.—A bill is now pending in Congress for a bridge across the Alabama River in Wilcox County, Alabama, to be built by the Pensacola, Alabama & Tennessee Railway Co.

PETERSBOROUGH, ONT.—The Joint Committee of the Town Council has decided to rebuild the Mud Lake bridge. It is estimated that a suitable bridge will cost \$35,000.

SCRANTON, PA.—The Scranton Traction Co. will build a viaduct over the tracks of the Delaware, Lackawanna & Western.

STROUDSBURG, PA.—Delaware Valley, Hudson & Lehigh. See Railroad Construction Column for this week.

SYRACUSE, N. Y.—The contract for building the bridge over the Erie Canal at Salina Street was awarded to the Groton Bridge Manufacturing Co. The bridge will cost \$28,000.

WILLIAMSPORT, PA.—The Commissioners of Lycoming County will soon ask for bids for bridges to be built in Moreland and Upper Fairfield. Edward J. Eldred, County Surveyor.

TAKAMAH, NEB.—Bids are wanted by the County Commissioners for building bridges in 1898. W. A. Moyer, Clerk, Burt County.

UTICA, N. Y.—The contract for building the lift bridge over the Erie Canal at Whitesboro street was awarded to Groton Bridge Manufacturing Co. Contract price, \$18,804.

The contract for the lift bridge at Broad street was awarded to the Havana Bridge Works, at \$18,480.

WILKES BARRE, PA.—The Grand Jury has recommended appropriations aggregating about \$39,000 for fifty-two bridges to be built in Luzerne County this year, all of which will be advertised some time this summer. Seven of these bridges are to cost upwards of \$1,000, and one, between Kingston and Dorreneton Boroughs, will cost \$10,000. Edward H. Post, County Surveyor, Wilkes Barre.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Boston & Maine.—Quarterly, common, 1½ per cent., payable April 1.
 Canadian Pacific.—Semi-annual, preferred, 2 per cent., common, 2½ per cent., payable April 1.
 Chicago, Burlington & Quincy.—Quarterly, 1¼ per cent., payable March 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.
 Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.
 Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.
 Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.
 Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.
 Chicago Electrical Association.—Meets at Room 7,137, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.
 Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.
 Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.
 Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.
 Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.
 Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.
 Engineers' Club of Philadelphia.—Meets at the house of the club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.
 Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.
 Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.
 Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.
 Locomotive Foreman's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.
 Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.
 New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.
 New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m.
 Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.
 Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.
 St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.
 Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.
 Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month at 8 p. m.
 Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. S. Sarge, Jr., 1,533 Marquette Building, Chicago, is secretary.
 Western Railway Club.—Meets in Chicago on the third Tuesday of each month at 2 p. m.
 Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago.

W. C. B. Association.

Members of the Association who wish accommodations at Congress Hall, Saratoga, for the June Convention, should make application for rooms prior to March 1, 1898, in order to be sure of accommodations. Applications should be made to H. S. Clement, Manager, Congress Hall, Saratoga Springs, N. Y.

Railway Signaling Club.

The next meeting of the Railway Signaling Club will be held at 3 o'clock Tuesday afternoon, March 8, at the Duquesne Hotel, Pittsburgh, Pa. Mr. W. A. D. Short, General Foreman of Signals of the Cincinnati, New Orleans & Texas Pacific, will read a paper entitled, "The Operation and Maintenance of a Block Signal System on a Single Track Road."

The Engineers' Society of Western Pennsylvania.

The regular monthly meeting of the Engineers' Society of Western Pennsylvania was held in the Society's house, Pittsburg, Pa., Feb. 15. The paper for the evening was read by Mr. J. N. Chester on "The Elevated Condenser for Central Condensing Plants." After discussion, in which the question of the best point at which to take up the air and similar subjects were dwelt upon, the Society adjourned to par-

take of a lunch which had been prepared by the Reception Committee.

This will be a feature of the meetings of the Society in the future.

Street Railway Association of Illinois.

The first annual convention of the Street Railway Association of Illinois will be held in Chicago, May 18. In connection with this convention it is proposed to have an exhibition of street railway appliances by the supply men. At a meeting of the Executive Committee of the association and representatives of the supply companies held in Chicago, Feb. 19, W. J. Cooke of the McGuire Manufacturing Co. was appointed to act as chairman of a committee of four representative supply men appointed by himself. This committee will bring the matter before the supply manufacturers, and another meeting will be called by President Patterson of the association to perfect plans for the project.

Southern & Southwestern Railway Club.

The next meeting of the Southern & Southwestern Railway Club will take place at the Kimball House, Atlanta, Ga., on Thursday, April 14, 1898, at 10 o'clock a. m. The following are the subjects for discussion: Revision of M. C. E. Rules.—Messrs. J. M. Holt, E. M. Roberts and S. A. Sexton as special committee. All members are requested to communicate without delay all suggestions concerning the rules to the chairman of the committee, Mr. J. M. Holt, Southern Railway Company, Washington, D. C.

Trains Parting.
 Exhaust Pipes.
 Modification of Standard Journal Boxes for Use with Pedestals in Freight or Passenger Rolling Stock.

All members are requested to investigate these subjects, and to bring or send the result of their work to the club.

Engineers' Club of St. Louis.

The four hundred and sixty-seventh meeting was held Feb. 16 at 8 p. m., with President Bryan in the chair. Thirty-four members and twenty-nine visitors were present, seventeen of the visitors being ladies.

The president announced the appointment of the following Entertainment Committee: Prof. J. H. Kinealey, chairman, and Messrs. W. A. Layman, E. R. Fish, George Bouton and Henry Branch.

The paper of the evening, entitled "Recent Advances in Electric Railway Practice," by Mr. Richard McCulloch, was then read. The paper described the recent application of electricity to interurban roads and heavy railroad service. A general description was given of the conduit roads now being installed in New York City. About sixty stereopticon views illustrating the paper were shown. After the reading of the paper the meeting adjourned to the library, where refreshments were served and an informal reception held.

PERSONAL.

—Mr. S. B. Thacher, Traveling Freight Agent for the Missouri, Kansas & Texas, with headquarters at St. Louis, has resigned, the resignation to take effect at once.

—Mr. E. V. Sedgwick, Locomotive Superintendent of the Interoceanic Railway of Mexico, with headquarters at Puebla, Mex., has resigned to engage in other business.

—Mr. A. D. Allibone, General Purchasing Agent of the Wisconsin Central, with headquarters at Milwaukee, has resigned. He will engage in other business in Providence, R. I.

—Gen. Joseph W. Burke, formerly Receiver and Manager of the Chattanooga Southern, has been appointed by President McKinley Collector of Customs for the District of Mobile, Ala.

—Mr. George W. Longaker, a Director of the Philadelphia, Germantown & Norristown and the Plymouth Railroad, which are leased lines of the Philadelphia & Reading, died at his home in Norristown, Pa., Feb. 16, at the age of 60.

—Mr. John Carter, Traveling Engineer on the Lake Shore & Michigan Southern, died at Norwalk, O., Feb. 14, at the age of 54. Mr. Carter had been Traveling Engineer on the Lake Shore & Michigan Southern since 1881.

—Mr. James F. Smith, at one time President of the East Pennsylvania, which is now leased to the Philadelphia & Reading, died at Reading, Pa., Feb. 8, at the age of 85. He was Consulting Engineer of the Philadelphia & Reading for many years.

—Mr. Dale Harman, Traveling Auditor for the Missouri lines of the Chicago, Burlington & Quincy, with headquarters at Hannibal, Mo., has resigned to accept a position as Traveling Auditor for the Armour Packing Co., with headquarters in Chicago, Ill. The change is to be made March 1.

—Mr. A. C. Michaels has resigned his position as General Manager of the Central Railway of Guatemala, owing to the revolution in that country, and has returned to the United States and is now in Kansas City, Mo. Mr. Michaels formerly was General Passenger Agent of the Mexican Central.

—Mr. John P. Wesner, heretofore General Freight Agent of the Allentown Terminal, which is a part of the Central of New Jersey, has resigned to engage in other business, resignation to take effect April 1. In 1889 and 1890 Mr. Wesner was Superintendent of Construction of the Allentown Terminal and later became General Agent, which position he held until now.

—Mr. Newton Reed Warwick, District Passenger and Freight Agent of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, with headquarters at Cincinnati, died at his home in Avondale, Ky., Feb. 10, at the age of 53. Mr. Warwick had been District Passenger and Freight Agent for twenty years, and in 1886 he was elected President of the International Association of Traveling Passenger Agents.

—Mr. P. S. O'Rourke, for many years Superintendent of the Southern Division of the Grand Rapids & Indiana, with headquarters at Ft. Wayne, Ind., died at that place Feb. 13. Mr. O'Rourke was Assistant Superintendent of the Michigan Lake Shore, now the

Chicago & Lake Michigan, until 1876, when he became Superintendent of the Southern Division of the Grand Rapids & Indiana.

—Mr. Edmund D. Codman, whose election as President of the Fitchburg was noted in these columns for last week, has been connected with the road for the past ten years, and was a Director and Clerk of the Company for the past two years. Mr. Codman is about 33 years old. Mr. Codman graduated from Harvard in the Class of '86 and afterwards studied law. In 1891 he became Secretary to President Henry S. Marcy of the Fitchburg and continued as such until his election to the Vice-Presidency. He had been acting President since the death of President Marcy last August.

—Mr. Henry Ward Johns died at his home at Park Hill, Yonkers, Tuesday night last, after an illness of several months. Mr. Johns was best known through his connection with the asbestos industry, of which he was a pioneer in this country. He was born in West Stockbridge, Mass., in 1837, and at an early age came to New York, engaging for a short time in various lines of business before determining upon that which was to be his life work. In 1858, while experimenting with a view to perfecting a fire-proofing compound, he became aware of the existence of asbestos, the indestructible, fibrous mineral, at the time but little known outside of laboratories and mineralogical collections. From this time until his death he worked continuously at the development of its commercial uses, and built up a business of great magnitude based upon his numerous inventions. A man of great business sagacity and ability, of large information and pronounced views on public and commercial topics, he nevertheless avoided public life, preferring to devote himself exclusively to his chosen field. Mr. Johns was president of the company bearing his name and of the Johns-Pratt Company of Hartford, and was at one time a director in the Western National Bank of New York.

—Mr. John Mulligan, President of the Connecticut River Railroad, which is leased to the Boston & Maine, died at his home in Springfield, Mass., Feb. 22, at the age of 78. Mr. Mulligan rose from a locomotive engineer to the Presidency of the Connecticut River Company. Early in life he served an apprenticeship to Daniel Copeland, a Hartford builder of engines. Later he worked in Philadelphia under William Norris, a celebrated locomotive constructor. The late Chester W. Chapin became interested in the young man and engaged him to run the steamer Phoenix, which plied on the Connecticut years ago between Springfield, Mass., and Hartford, Conn. In 1842 he entered the employ of the Boston & Albany road, then the Western Railroad, as machinist, and later became an engineer, in which position he remained for ten years.

After this term his rise was rapid. In 1852 he was made Master Mechanic of the Connecticut River Railroad, and in 1868 he was made Acting Superintendent, in addition to his duties as Master Mechanic. Four years later he was made Superintendent. In 1890 he succeeded Mr. N. A. Leonard as President of the company. He was also Superintendent of the Sullivan County, which is now a part of the Boston & Maine, from 1880 to 1893.

Mr. Mulligan was at one time President of the Hamden Savings Bank and a director of the Chapin National Bank, both of Springfield, Mass. He resigned the bank Presidency about a year ago.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—George J. Lincoln, heretofore Commercial Freight Agent, with headquarters at Philadelphia, Pa., has resigned, resignation to take effect March 1. He will be succeeded by E. S. King. (See this column for last week.) Ben Wilson has been appointed General Live Stock Agent.

Baltimore Steam Packet Co.—E. W. Thompson having resigned, the office of Traffic Manager has been abolished, and the following appointments are announced: William Randall has been appointed General Freight and Passenger Agent, with headquarters at Baltimore. Major R. L. Poor has been appointed Commercial Agent, in charge of all freight solicitation, with headquarters at Baltimore. Key Compton has been appointed General Agent at Norfolk, Va., with supervision over agencies at Portsmouth and Fort Monroe, Va.

Chicago & Northwestern.—William S. Worman, heretofore Special Agent at Chicago of the Liverpool, London & Globe Insurance Co., has been appointed to the newly created office of Fire Inspector on the Chicago & Northwestern, with headquarters at Chicago. He will inspect all the buildings of the road, with a view to the best means of protecting them from fire.

Chicago, Burlington & Quincy.—Dale Harman, Traveling Auditor of the Chicago, Burlington & Quincy, with headquarters at Hannibal, Mo., has resigned. The resignation is to take effect March 1. He will be succeeded by H. C. Evans, heretofore Traveling Auditor with headquarters at St. Joseph, Mo. Dr. Ferguson, Surgeon of the Voluntary Relief Department, with headquarters at Hannibal, Mo., has been transferred to St. Joseph, Mo. He will be succeeded at Hannibal by J. J. Brown, of Wynmore, Neb. The change takes effect Mar. 1.

Chicago, Milwaukee & St. Paul.—Edward D. Sewell, heretofore Assistant General Freight Agent at Milwaukee, has been appointed General Northwestern Agent, with headquarters at Minneapolis. He will have immediate charge of the traffic interests in St. Paul, Minneapolis, the territory north and west thereof to and including Missoula and Kalispell, Mont.; the Iowa & Minnesota Division north of Ramsey, the Hastings & Dakota and James River divisions, in addition to such other duties as may be assigned to him by the General Freight and General Passenger Agents. D. C. Jones, heretofore Assistant General Freight Agent at Minneapolis, has been transferred to Chicago. W. E. Taylor, heretofore General Traveling Freight Agent at Green Bay, Wis., has been appointed Division Freight and Passenger Agent of the Superior Division, with headquarters at Milwaukee. The changes and appointments take effect March 1. The jurisdiction of D. W. Keyes, First Assistant General Freight Agent, Milwaukee, has been extended to include the Superior Division.

The office of Assistant General Freight Agent, Superior Division, has been abolished.

Cincinnati, Lebanon & Northern.—At the annual meeting of this company, which is a part of the Pennsylvania, held at Cincinnati, O., Feb. 16, Edward B. Taylor was elected a Director, succeeding John E. Davidson.

Cleveland, Cincinnati, Chicago & St. Louis.—M. C. Greeger, heretofore Assistant Ticket Agent at Columbus, has been appointed Passenger Agent, with headquarters at the same place. William David Emile, heretofore connected with the office of Advertising Agent J. W. Irvine, has been appointed Assistant Advertising Manager.

Delaware, Lackawanna & Western.—C. L. Hackstaff, heretofore General Eastern Freight and Passenger Agent, with headquarters in New York City, will hereafter devote all his time to the freight department, and W. F. Thornton, heretofore Rate Clerk, has been appointed Eastern Passenger Agent, relieving Mr. Hackstaff of the passenger business. Headquarters of both are at 429 Broadway, New York City.

Delaware Valley, Hudson & Lehigh.—The officers of this Company referred to in another column are as follows: President, J. V. Lung, 382 Marion Street, Brooklyn, N. Y.; Secretary and Attorney, J. H. Shull, Stroudsburg, Pa.; Chief Engineer, S. R. Kupp, Stroudsburg.

Finley, Fort Wayne & Western.—J. E. Barner, Assistant General Freight and Passenger Agent, with headquarters at Findlay, O., has tendered his resignation to accept the position of Traveling Auditor for the Western Railway Weighing Association, and hereafter his headquarters will be in Chicago, Ill.

Fitchburg.—Charles T. Ames has been appointed Traveling Freight Agent, succeeding J. H. McDaniels, promoted. The office of Traveling Freight Agent hereafter will be at Union Station, Troy, N. Y., instead of Reading, Pa. The change was effective Feb. 1.

Grand Trunk.—Marshall C. Sturtevant has been appointed to the new office of Car Service Agent, with headquarters at Montreal, Que. Mr. Sturtevant will have charge of the use and distribution of all freight and passenger cars, including the loading, unloading and forwarding.

Granite Railway Co.—At the recent annual meeting of this company held in Boston, Mass., the following directors and officers were elected: William B. Sewall, President; J. R. Ballard, Vice-President; R. B. Williams, H. E. Sheldon, Howard Sargent, O. H. Luke, J. Albert Simpson, Clerk and Treasurer, and J. E. Sullivan, Manager, succeeding H. E. Sheldon, resigned.

Hutchinson & Southern.—The new officers of this company, referred to in another column, are as follows: President, W. A. Bradford, Jr., Boston, Mass.; Vice-President and General Manager, L. E. Walker, Hutchinson, Kan.; Secretary and Treasurer, R. N. Allen, Boston, Mass.; Assistant Secretary and Treasurer, James A. S. Graves, Hutchinson, Kas. Judge W. M. Whitelaw is General Solicitor of the road.

Interoceanic.—H. E. Walker has been appointed Locomotive Superintendent of the Interoceanic Railway of Mexico, with headquarters at Puebla, Mex., succeeding E. B. Sedgwick, resigned. Mr. Walker formerly was Superintendent of Machinery of the Mexican Southern.

Kansas City, Pittsburgh & Gulf.—C. A. Shank, heretofore Commercial Agent of the St. Louis Southwestern at Chicago, has been appointed Commercial Agent of the Kansas City, Pittsburgh & Gulf, with headquarters at Chicago, Ill.

Lehigh & Wabash Despatch.—C. M. Brown, heretofore Contracting Freight Agent of the Wabash, has been appointed Agent at St. Louis, succeeding J. E. Bostick, resigned. The appointment took effect Feb. 21.

Lehigh Valley.—As reported in these columns for Jan. 28, the General Traffic Offices, now at Philadelphia, will be transferred on May 1 to New York City. Office will be opened in the Havemeyer Building in Cortlandt street. E. P. Mooney has been appointed Master Mechanic of the Buffalo Division with headquarters at Buffalo, N. Y., succeeding John Campbell, recently resigned. Mr. Mooney has been acting as Road Foreman of Engines and Traveling Engineer of the Buffalo Division for six years. Alvin C. Smith of Buffalo, has been appointed to succeed Mr. Mooney.

Louisville & Nashville.—J. E. Eaves, heretofore Assistant Contracting Freight Agent, has been appointed Contracting Freight Agent, succeeding Ben Helm, resigned. His headquarters are to be at New Orleans, La. J. A. Ridgely has been appointed to succeed Mr. Eaves.

Louisville, Evansville & St. Louis.—The offices of Assistant Engineer and I. N. Munson, superintendent of Bridges and Buildings have been removed from Louisville and Huntington to Princeton, Ind. The changes were made on Feb. 1.

Mobile & Ohio.—Charles F. Smith has been appointed Northwestern Passenger Agent, with headquarters at St. Paul, Minn. He will report to and be under the direction of Charles Rudolph, District Passenger Agent at Chicago.

Oregon Railroad & Navigation Co.—Capt. George Conway has been appointed Superintendent of Water Lines with office at Portland, Ore., succeeding Capt. E. J. Rathbone, resigned, to accept service elsewhere. The change was made Feb. 10.

Philadelphia & Reading.—John H. Leonard, heretofore Agent at Philadelphia, has been appointed Division Freight Agent, with headquarters at Williamsport, Pa., succeeding Samuel W. Stevens, who resigned Feb. 1.

Pittsburg & Western.—Paul Didier, heretofore Assistant Chief Engineer, hereafter will have entire charge of bridges and buildings, succeeding A. S. Markley. His headquarters are at Allegheny, Pa.

Richelieu & Ontario Navigation Co.—At the annual election recently held at Richelieu, Ont., J. Kerr Os-

borne, Vice-President of the Massey-Harris Co., machinists, of Ontario, was elected a Director.

Tuscarora Valley.—At the recent annual meeting held at Port Royal, Pa., the following new Directors were elected: L. S. Catlin, C. F. Espenschade and H. G. Cahill. At a meeting of the Directors held later J. C. Moorhead, heretofore Secretary and Treasurer, was elected Vice-President, Treasurer and Superintendent. C. F. Espenschade was elected Secretary, with headquarters at Mifflintown.

Union Pacific.—Harry C. Smith, heretofore Traveling Passenger and Freight Agent, with headquarters at Cincinnati, O., has been appointed Traveling Freight Agent, with headquarters at the same place.

Wabash.—W. J. Saxe has been appointed Contracting Freight Agent, with headquarters at St. Louis, succeeding C. M. Brown, resigned.

White River, Lonoke & Western.—The officers of this company referred to in another column are: President, A. P. Brewer; Vice-President, A. Bushnell; Secretary, Dan Daniels; Treasurer, Joe P. Eagle; General Freight and Passenger Agent, F. C. Brewer; General Manager, J. N. Wooley. The central office is Jacksonville, Ark.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

ARKANSAS CENTRAL.—Official statement is received that this line is complete from Fort Smith, Ark., east 28.5 miles to Charleston, and that the company is at work extending the line to Paris, 16 miles beyond. It is expected that this section will be completed about May 1, making the total distance 44.5 miles. The route east of Paris is not definitely located, but the company has parties in the field examining the country and preparing to define the line. The probable route will be through the counties of Logan, Yell, Perry, Pulaski, Saline and Garland, keeping from 15 to 20 miles south of the Arkansas River, with a branch line to Hot Springs, the main line stopping some 50 miles west of Little Rock. The company has about 400 men at work. No contracts have been let. The maximum grades on the first section are 50 ft. per mile and the maximum curvatures 4 degrees. There are no iron and steel bridges and no tunnels on the line. The final arrangements for the first 44 miles are definitely arranged. N. B. Kendall, of Fort Smith, Ark., is General Manager. (See this column for Jan. 11.)

ATLANTIC COAST LINE.—Official statement is received that the Southeastern extension from Elrod, N. C., on the main line in Robeson County, southeast 10.38 miles to Asphole, in the same county, is nearly completed, and the line will probably be open for traffic about March 1. No new rolling stock has been purchased for this line, as it is short and the business will be light. (See this column for Dec. 3.)

BEAUMONT WHARF & TERMINAL.—This company, according to report, has purchased several more tracts of land to be used in the proposed building of line of 8.5 miles around the city of Beaumont, Tex. The fact was stated in these columns last November that one mile of track has been built and the rails and ties purchased for the entire line. W. Wilson, of Beaumont, Tex., is Vice-President.

CANADIAN PACIFIC.—Official statement is received that the Columbia & Western, which extends from Robeson, B. C., to Rossland, 48 miles, has been acquired by the Canadian Pacific and that the section from Trail to Rossland, which is narrow gauge, will be widened to the standard. No extensions are contemplated. The report referred to in this column for Feb. 11 that extension is to be made from Toronto north to Sudbury is confirmed. Surveys are just beginning.

CHICAGO, ROCK ISLAND & PACIFIC.—An ordinance has been introduced in the City Council of Peoria, Ill., granting joint permission to this company and to the Rock Island & Peoria to reconstruct tracks and to build additional tracks, spurs, sidings and switches in that city.

CLEVELAND, LORAIN & WHEELING.—At a special meeting of the stockholders held at Cleveland Feb. 17 the Directors were authorized to build short spurs to coal mines in Stark County, O. This formality is necessary under the statutes of that State.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Official statement is received with reference to the work being done by this company at Anderson, Ind. (see this column for Feb. 11), that the Crouch Construction Co. is simply grading about one mile of side track to reach the gravel pit and is to strip the loam and soil off the top of the bed.

DEEP WATER RAILWAY.—According to official statement the route of this road, which was incorporated in West Virginia Jan. 25 (see this column for Feb. 4), is to be from Deep Water, W. Va., on the Kanawha & Michigan up Lower Loop Creek to Glen Jean, Fayette Co., W. Va. Surveys and construction have been partially completed. The last contracts have been let to M. N. Moorman, Jr., & Co., of Lynchburg, Va. The first section of 4 miles from Deep Water to Robeson is completed and in operation. The work is heavy side-cutting in rock with numerous creek crossings. The maximum grade, so far as location has been made, is 1.5 per cent, and the maximum curvature 16 degrees. There are nine creek crossings in the 4 miles already built, aggregating 17 spans of steel truss and I-beam bridges. The bridging of the Kanawha River and further extensions of the line are matters to be determined in the future. The road is being built by the Gauley Mountain Coal Co. of Ansted, W. Va.

DELAWARE VALLEY, HUDSON & LEHIGH.—Official statement is received that the route of this proposed road is from Stroudsburg, Pa., northeast 45 miles up the Delaware Valley through Bushkill, Milford to Matamoras. Preliminary surveys have been completed indicating that the work will be easy, with no grades to exceed 25 ft. per mile and no curves more than 3 degrees. There will be one bridge 600 ft. long, four bridges from 20 to 30 ft. in length, and several small culverts, none to exceed 20 ft. The officers of this company are given in another column. (See this column for Aug. 2.)

DENTON & FEDERALSBURG.—A bill was introduced into the Maryland Legislature Feb. 18 to in-

corporate this company with a capital stock of \$200,000 to build a line from Denton, on the Queen Anne's Railroad, or from a point on that road within five miles east of Denton, south about 20 miles to Federalburg. The incorporators are: Emery D. Turpin, Thomas W. Jones, Henry R. Lewis, John H. Vangesel, M. Bates Stephens, Charles W. Hobbs, Henry T. Nuttle, William G. Nuttle, B. Gotte Stevens, Edward W. Linden, Henry B. Messenger and James B. Wright.

ERIE & CENTRAL NEW YORK.—Official notice is received that grading on the entire line from Cortlandt, N. Y., south 19 miles to Cincinnatus has been completed. Rails have been laid for 16 miles to Willet station, over which trains are now running. Ballasting is completed to Solon, 8 miles. Bridges are now completed with the exception of one trestle, which should be finished by March 15. Fifty men are at work with three teams. W. D. Tisdale of Cortlandt, N. Y., is President. (See this column for Jan. 7.)

GILA VALLEY, GLOBE & NORTHERN.—This company gives notice that it will receive bids at the main office, 314 Stimson Block, Los Angeles, Cal., up to 6 p. m. March 10, for grading between 40 and 50 miles of the proposed extension of its line from Geronimo, Ariz., toward Globe. Maps and profiles are on exhibition at the Company's office. William Garland of Los Angeles is President. (See this column for Jan. 28 and Feb. 18.)

GREAT NORTHERN.—Official statement is received that 1,200 teams are at work on the extension of the Fosston Branch from Fosston, Minn., east 220 miles to Duluth. As yet grading has not been completed on any section of the extension. (See this column for Dec. 17.)

GREENWOOD, ANDERSON & WESTERN.—A new company has been incorporated under the name of Seivern & Knoxville, as successor to the Greenwood, Anderson & Western. This road was ordered sold on Nov. 1 last, and Herbert Sass was appointed Special Master. The company was originally organized to build an extension of the Carolina Central, which it leased, from Seivern, S. C., north 66 miles to Batesburg and Greenwood. Only about 15 miles were completed when work ceased and the lease of the Carolina Central was cancelled. (See this column for Nov. 5.) The road must be completed to Batesburg within five years.

GULF & INTERSTATE.—The Bolivar Channel & Dock Co. was incorporated in Texas Feb. 12, with a capital stock of \$100,000 to provide terminal facilities at Bolivar Point for the Gulf & Interstate, which is being built in Texas in connection with the Galveston, Brazos & Southwestern. L. P. Featherstone of Galveston, Tex., General Manager of both railroad companies, filed the incorporation papers.

GULF, COLORADO & SANTA FE.—A letter from this company states that preliminary surveys have been made for the extension from the main line at Daugherty, I. T., into the asphalt deposits referred to in this column for Feb. 4, but no definite arrangements have been made for building the line.

HUTCHINSON & SOUTHERN.—Official statement is received that the grading on the extension from Medford, Okla., east 25 miles to Blackwell, is nearly completed. About one-half of the rails have been laid. The grading is under contract to J. D. Alexander, of Wichita, Kan., and the balance of the work is being done by W. A. Bradford, Jr., & Co., of Hutchinson, Kan. The maximum grade is 1 per cent. The rails come from the Illinois Steel Co. White oak ties are used, which come from Arkansas. The line is being built in a thoroughly first-class manner in every respect. When completed it will become a part of the recently reorganized Hutchinson & Southern. (See this column Jan. 28.)

INDIANAPOLIS UNION.—At a meeting of the representatives of the various companies owning this road held at Indianapolis, Ind., Feb. 15, it was decided to purchase two miles of 85-lb. rails for relaying the tracks of that road.

LAKE ERIE & DETROIT RIVER.—This company's lines, according to report, will be extended from Ridgetown, Ont., northeast about 65 miles to St. Thomas. The line now runs from Walkersville, opposite Detroit, east 84 miles to Ridgetown. The company has a lease of the London & Port Stanley, which extends from Port Stanley north 23.66 miles through St. Thomas to London. The proposed extension would connect these two lines.

LAKE ERIE & WESTERN.—George Hugill is reported to have been awarded a contract for connecting the Northern Ohio Line of this company at Akron, O., with the tracks of the Cleveland, Akron & Columbus in that city. This is said to be preparatory to the extension of the Lake Erie & Western east 85 miles to New Castle, Pa., where connections will be made, as stated last week, with the Buffalo, Rochester & Pittsburgh, which is extending its line from Punxsutanney, Pa. Heavy cuts will be required in making the connection at Akron. All the trestles on this division between Akron and Medina, according to report, are to be filled and the roadbed improved and widened for double-tracking.

LEHIGH VALLEY.—Official statement is received that grading has been completed for 7.25 miles on the Seneca County extension from Geneva Junction, N. Y., east to Seneca Falls, 8 miles. Rails have been laid and ballasting completed for 6 miles to Kingston Road and trains are running as far as Waterloo, 4.6 miles. All bridges have been completed. About sixty men and twenty teams are now at work. (See this column for Jan. 14.)

MEXICAN NATIONAL.—Official statement is received that work is progressing satisfactorily on the extension of the Patzcuaro Branch of about 50 miles west toward the Pacific to the City of Uruapan. The road is being built by the company. There are no contracts to be let and no equipments purchased. It is expected that the line will be completed in June. (See this column for Aug. 20.)

MOBILE & OHIO.—Official statement is received that the extension of this line from Columbus, Miss., southeast 169.8 miles through Tuscaloosa to Montgomery, Ala., will be completed by the middle of March and the operation of that division will begin six weeks later.

MONROE RAILWAY & CONSTRUCTION CO.—The route of this proposed road is officially stated to

be from Monroe, La., southwest about 110 miles via Winfield to Natchitoches. Surveys have not yet been made. L. D. McLain is President, John P. Parker Vice-President and J. N. Keller Secretary. R. A. Shotwell of Monroe is among those interested.

NATCHEZ, OPELOUSAS & GULF.—This company has been organized at Opelousas, La., to build a line from Vidalia, opposite Natchez, Miss., through the parishes of Palmetto, Washington, Opelousas and Crowley to Southwest Pass, La. Among the projectors are the following of St. Landry Parish: E. D. Estille, C. Settoon, J. E. Shute, Remi Morhimveger, James T. Stewart, Leon Wolf and W. C. Burke. Thomas H. Lewis of Opelousas is Attorney, and Ira W. Sylvester General Manager.

NATIONAL PARK, SILVER SPRING & HYATTSVILLE.—A bill was introduced into the Maryland Legislature Feb. 14 to incorporate this company with a capital stock of not less than \$50,000, which can be increased to \$100,000, to build a line from Rock Creek, north of the District of Columbia, in Montgomery County, through Montgomery and Prince George Counties to Hyattsville. Among the incorporators are Francis H. Smith, Jackson H. Ralston and Roger Bellis of Prince George County; G. B. Smith, Conowingo, Md.; Richard Morton, Jr., Baltimore, Md.; Louis H. Finney, John C. Davidson, Washington, D. C.; John Leeds Bowie and H. Bardley Davidson, Montgomery County.

NEWFOUNDLAND RAILROAD.—The Newfoundland Cabinet has made arrangements with Mr. R. G. Reid, who built the Northern & Western Government Railway recently completed from St. John's east to Port-aux-Basques, for extensive developments of that road and for other important works. Mr. Reid contracts to operate the entire railroad system of the colony, 600 miles, for 50 years in return for a land subsidy of 2,500 acres per mile. The government is to transfer to Mr. Reid the extensive coal areas now reserved to the Crown. He will purchase the dry dock at St. John's and the government telegraph service, which he is to pay \$125,000. He contracts to build seven steamers to ply between the Great Bays and Labrador, connecting with the railroad. He undertakes to establish pulp and lumber mills, to operate the coal, copper, pyrite and other mines, and also the immediate construction of an electric railway in St. John's, including the paving of the main streets of the city. As a guarantee of the faithful performance of this contract, Mr. Reid pays over to the government \$1,000,000 in cash which with interest accumulations will belong to the colony at the expiration of 50 years. The government will guarantee to Mr. Reid a duty of \$1 a ton on foreign coal and subsidies of \$100,000 a year for 30 years on rail and steamer lines, and \$12,000 per year for seven years on the telegraph line. He is to receive a charter to land a cable and a bonus of \$200,000 toward completing the unfinished branch railroads, and \$140,000 toward the expenses of paving the city streets.

NEW ROADS.—A letter from W. A. Blair, Secretary of the Chamber of Commerce of Winston, N. C., states that the Chamber of Commerce has authorized a preliminary survey for a railroad from Kernersville, a few miles east of that city, northeast about 30 miles to Reidsville. The Southern Railroad is already extending its road to the west with which extension this would connect. The Chamber of Commerce is also interested in a southbound road from Winston to connect the Norfolk & Western with a point on the South Carolina State line. The State of North Carolina offers to furnish convicts to grade the road, an act for this purpose having passed the Legislature. Mr. Blair states that some active railroad men can make a good thing by joining forces with the Chamber of Commerce on this road, as it is almost a free gift from the State and the counties and towns to the south of Winston.

PENNSYLVANIA.—A bill has been introduced into the Maryland Legislature authorizing this company to extend its road from Belton on the Baltimore & Potomac Division, west two miles to Chapel Point, a summer resort.

RALEIGH & CAPE FEAR.—This company has been incorporated in North Carolina with a capital stock of \$200,000, to build a line from Raleigh south about 35 miles to Lillington, the county seat of Harnett County.

ST. LOUIS & OKLAHOMA CITY.—Sub-contracts for the proposed extension described last week from Sapulpa, Ind. Ter., west 108 miles to Oklahoma City, Okla. Ter., have been let by Johnston Bros. & Fraught of St. Elmo, Ill., as follows: St. Joe Construction Co., St. Joseph, Mo.; John Burke, Charles Havens, A. G. Brown & Bro. and F. W. W. Johnson of St. Elmo, Ill.; Warr & O'Hearn and D. J. McDonald of Kansas City, Mo.; J. W. Powell, Osborne, Mo.; E. J. Maloney, Helena, Ark.; A. N. Spencer, Yukon, Ind. Ter.; D. R. Morris, Ft. Smith, Ark., and Welsh Bros., St. Louis, Mo.

SALUDA & JOHNSTON.—A bill has passed the Lower House of the South Carolina Legislature to incorporate this company with a capital stock of \$35,000, to build a line from Johnston north about 25 miles to Saluda. The incorporators are: Albin Etheredge, W. S. Allen, B. F. Lewis, C. J. Terrell, J. A. Attaway, W. A. Edwards, B. W. Crouch, E. W. Avill and J. J. Kirksey.

SANDUSKY, CASTALIA & CRYSTAL SPRINGS.—This company was incorporated in Ohio Feb. 17 with a capital stock of \$25,000, to build a line from Sandusky west through the counties of Erie, Sandusky and Ottawa to Port Clinton on Lake Erie. The incorporators are: C. O. French, F. B. Zollinger, A. J. Peters, W. E. Guerin, Jr., and Clark Rude. The headquarters are at Sandusky, O.

SANTA FE & GRAND CANYON.—A certificate of beginning construction on this road has been filed in the office of the Arizona Secretary of State, indicating that surveys have been completed. The road is to run from Williams, Ariz., a point on the Santa Fe Pacific, north to Flagstaff Junction, 40 miles; thence north to the rim of the Grand Canyon of the Colorado, 23 miles, a total of 73 miles. W. M. O'Neil of Prescott, Ariz., is General Manager. The Lombard-Goode Co. of 11 Broadway, New York, is building this road. (See this column for Nov. 19.)

ST. LOUIS, CHICAGO & BALTIMORE.—Preliminary surveys have been practically completed on

this line which is projected to run from Sioux City, Ia., southeast 512 miles to St. Louis. L. F. Wakefield of Sioux City is Chief Engineer. (See this column for Nov. 12.)

SOUTHERN.—Official confirmation is received to the statement made in this column Feb. 4 that surveys have been completed for a branch line from Leeds, Ala., to the ore mines of Sloss Iron & Steel Co., about four miles, and contracts are about to be let.

VIRGINIA CENTRAL.—A bill has been introduced into the Virginia Legislature to incorporate this company to build a line from a point on the Potomac in Loudoun County southwest to some point in Rappahannock, Culpeper or Page Counties. Incorporators are E. V. White, Henry Fairfax, John F. Ryan, John H. Alexander, T. C. Pilcher and George W. Settle.

WHITE RIVER, LONOKE & WESTERN.—Official statement is received that this company, which was incorporated in Arkansas Feb. 3 (see this column for Feb. 11), is building a line from Wooley, a point on the St. Louis Iron Mountain & Southern, southwest through Lonoke to Seaton. The grade is light and there is no heavy building. The road is being constructed by local capital and without bonds. Thirty-five pound rails are being laid into Lonoke, and the ten miles to Seaton will be built in July and August. The officers are given in another column.

Electric Railroad Construction.

AMESBURY, MASS.—Press reports state that the Amesbury & Hampton Street Railroad Co. has been formed with capital of \$30,000 to build an electric railroad to the New Hampshire State line. E. R. Briggs and A. Scott, Amesbury, are mentioned as being interested.

ANNAPOLIS, MD.—The Washington, Annapolis & Chesapeake Railway Co. has been incorporated. The incorporators are Henry H. Brogren, James B. Belt, Augustus Burgdorf, Charles M. Wells, George S. Chase, George R. Brennan and Edward H. Way. The terminus is Washington, Annapolis and a point on Chesapeake Bay north of Plum Point, Calvert County. The capital stock is \$10,000, with authority to increase to a million and a half.

BALTIMORE, MD.—It is stated that the City Passenger Railway Co. plans to build a line to Roland Park.

BIRMINGHAM, ALA.—The Birmingham Traction Co. ("Railroad Gazette," Sept. 24, '97) has let all contracts for the proposed railroad from East Birmingham to Gate City. The President of the Company is A. T. Loudon; Chief Engineer, George H. Clarke.

CHARLOTTE, N. C.—The Charlotte Electric Railway, Light & Power Co. will make extensions of tracks this year.

CHICAGO, ILL.—The Town Board of Cicero passed two ordinances on Feb. 14, providing for an elevated road, with a five-cent fare, to the business district of Chicago. The first ordinance, for the Cicero & Harlem, gives the company the right to build an elevated railroad from Fifty-second street to Harlem avenue, on Lake street and South Boulevard, and provides that passengers may be carried to any point on the Union loop for five cents. The second ordinance gives to the Cicero & Proviso an extension of its franchise for 50 years, and provides for a commutation rate to Chicago of 12 rides for one dollar. Under the ordinances the elevated road must be completed by July 15, 1898, the second ordinance not taking effect until the elevated is finished. Both ordinances have been accepted by the Lake Street Elevated Railroad of Chicago, and work on the extension of the elevated structure will be pushed forward at once. The Lake Street Elevated will be continued to Taylor street, one mile west, under the Cicero & Harlem ordinance, and from that point the track will be inclined until the surface is reached. The surface extension will run to Harlem avenue, making a total extension of 2½ miles. The train service will be continuous. The elevated cars will be run by trolley over the surface road, and by the third rail over the elevated structure.

CRESCENT SPRINGS, KY.—The Crescent Springs & Erlanger Electric Street Railway Co. ("Railroad Gazette," July 2, 1897) has made surveys and is now securing right of way for its proposed road from Ludlow to Florence, via Bromley, Greens Station, Crescent Springs, Kenton Heights and Erlanger. E. O. Young, Engineer, Covington, Ky.

DETROIT, MICH.—Press reports state that Col. Seymour Brownell, E. W. Voight and James A. Randall will build an electric road from Detroit to Farmington, Northville and Pontiac.

ELYRIA, O.—Efforts are being made to form a company to build an electric railroad in Lorain County, to run from Lorain to Elyria, Oberlin and Wellington. Among those said to be interested in the project are W. Vischer of Wellington, J. W. Steele of Oberlin, and H. G. Redington of North Amherst.

HALIFAX, N. S.—The Halifax & Bedford Electric Co. is composed of Dr. Chisholm, ex-Mayor Keefe, E. F. Freeman and others of this city. The company will build an electric railway from Halifax to Bedford, with such extensions as may be approved by the municipalities. The capital stock is placed at \$250,000.

HARTFORD, CONN.—The Bloomfield, Tariffville & East Granby Tramway Co. has concluded negotiations for the construction of the part of its line running south from Bloomfield to West Hartford and east to the city line connecting with the extension of the Hartford Street Railway.

MIDDLETOWN, CONN.—The consolidated Middletown Street Railway Co. and Portland Railway Co. will build a line in the Spring from Gildersleeve to Glastonbury, where connections will be made with the East Hartford line. The officers are Pres., John M. Douglass; Secy., and Treas., James K. Guy, Middletown; Supt., E. W. Goss, Portland.

OCEAN CITY, N. J.—The Ocean City Electric Railroad Co. will extend its line to Carson's Inlet, a distance of five miles along the beach.

PHILADELPHIA, PA.—The Germantown & Fairmount Park Street Railway Co. was recently incorporated. The line will run on Paluski avenue to Penn. King and return. Capital, \$80,000. The incorporators are Charles E. Morgan, W. Rotch Wister, William G. Warden, Josiah M. Bacon, Samuel T. Bodine, Richard Ashhurst, Joseph Bushnell, William Wharton, Jr.

A charter of incorporation was granted at Harrisburg, Feb. 21, to the Standard Traction Co. The capital named is \$1,000; directors, Maynard S. Young, Edwin F. Morse and Wm. S. Doran, all of Philadelphia.

PITTSBURGH, PA.—Press reports state that the West Side Belt Railroad is making preparations to float \$1,000,000 of 5 per cent. bonds. This road is practically an extension of the United Traction Co.

SALT LAKE CITY, UTAH.—The West Side Railway Co., it is stated, will make extensions to Bingham at an early date.

SAN FRANCISCO, CAL.—The San Francisco & San Mateo Electric Railway Co. will build an extension of its line to Ingleside.

STREATOR, ILL.—La Salle County Railway Co., Streator, was recently incorporated, with a capital stock of \$500,000, to build and operate a street railroad in the counties of Cook, La Salle, Grundy, Will, Kendall, Kane and Dupage; incorporators, C. H. Rathbun, W. H. Boys, W. H. Holcomb.

SYRACUSE, N. Y.—At the stockholders' meeting of the Syracuse & East Side Railway Co. it was voted to lease the road for a term of 22 years to the Syracuse Rapid Transit Railway Co. The new lease contemplates the construction of a continuation of the double tracks of the East Side line through Burnett avenue to the city line; a double track through Eastwood and also a double track in the town of Dewitt as far as the corner of Boston and Caleb avenues. Subsequently the stockholders voted to increase the capital stock of the company from \$250,000 to \$375,000, the stock to consist of 3,750 shares, each share of the par value of \$100. It was also voted to classify the capital stock of the company into preferred and common stock, so that \$125,000 of the capital stock shall become preferred stock.

WEBSTER, MASS.—A 50-year franchise has been granted the Webster & Dudley Electric Railway Co., which will build an electric railroad from Perryville, in Dudley, to Webster Lake. The capital stock of the company is \$50,000.

WESTBROOK, ME.—Contracts will be let in March for the proposed electric line between Westbrook, Windham and Harrison. The president of the company is J. C. Scates, Westbrook. Chief Engineer, A. S. Dickinson.

WINDSOR, CONN.—Press reports state that J. W. Starr, manager of the Springfield & Southwestern Railroad Co., has purchased the charter of the Windsor & Suffield Tramway Co. and proposes to complete the line this summer.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

		1897.	1896.	Inc. or Dec.
December 31:				
Baltimore & Ohio.				
1 month.....	Gross	\$2,404,410	\$2,177,804	I. \$226,606
1 ".....	Net	701,905	550,386	I. 151,519
6 months.....	Gross	14,031,374	13,513,351	I. 518,023
6 ".....	Net	3,900,064	3,384,816	I. 515,248
Bangor & Aroostook.				
3 months.....	Gross	\$207,002	\$203,256	I. \$3,746
3 ".....	Net	91,803	85,430	I. 6,373
6 months.....	Gross	775,633	719,717	I. 55,916
6 ".....	Net	305,420	279,944	I. 25,476
Chicago & Alton.				
12 months.....	Gross	\$6,673,605	\$6,840,283	D. \$166,678
12 ".....	Net	2,519,926	2,801,734	D. 281,808
Chicago, Indianapolis & Louisville.				
1 month.....	Gross	\$255,567	\$247,092	I. \$8,475
1 ".....	Net	58,222	54,467	D. 3,755
6 months.....	Gross	1,733,354	1,485,466	I. 247,888
6 ".....	Net	556,791	461,255	I. 95,536
Chicago, St. Paul, Minneapolis & Omaha.				
12 months.....	Gross	\$8,652,793	\$8,156,193	I. \$496,600
12 ".....	Net	2,915,346	3,019,156	D. 103,810
Colorado Midland.				
6 months.....	Gross	\$962,229	\$876,403	I. \$85,826
6 ".....	Net	232,442	156,007	I. 76,435
12 months.....	Gross	1,757,371	1,824,037	D. 66,666
12 ".....	Net	411,811	414,206	D. 2,395
Lake Erie & Western.				
1 month.....	Gross	\$313,398	\$287,026	I. \$26,372
1 ".....	Net	153,176	135,057	I. 18,089
12 months.....	Gross	3,439,396	3,344,273	I. 95,123
12 ".....	Net	1,463,283	1,427,016	I. 36,267
New London Northern.				
3 months.....	Gross	\$201,814	\$171,121	I. \$30,693
3 ".....	Net	65,898	41,420	I. 24,478
Northern Central.				
12 months.....	Gross	\$6,732,703	\$6,286,602	I. \$446,101
12 ".....	Net	1,934,336	1,643,497	I. 290,839
Ohio River.				
1 month.....	Gross	\$79,532	\$76,073	I. \$3,459
1 ".....	Net	22,267	24,756	D. 2,489
12 months.....	Gross	965,196	968,670	D. 3,473
12 ".....	Net	341,899	326,745	I. 15,154
Philadelphia & Erie.				
12 months.....	Gross	\$4,601,257	\$4,512,911	I. \$88,346
12 ".....	Net	1,300,079	1,231,996	I. 68,083
Santa Fe, Prescott & Phoenix.				
6 months.....	Gross	\$366,652	\$306,654	I. \$59,998
6 ".....	Net	204,671	157,518	I. 47,153
Janu-ry 31:				
1898.				
Buffalo & Susquehanna.				
7 months.....	Gross	\$397,355	\$346,851	I. \$50,504
7 ".....	Net	174,090	184,628	D. 10,538
Cincinnati, New Orleans & Texas Pacific.				
1 month.....	Gross	\$332,836	\$263,283	I. \$69,552
1 ".....	Net	101,159	91,023	I. 10,036
7 months.....	Gross	2,272,712	1,984,522	I. 288,190
7 ".....	Net	754,326	588,854	I. 165,472
Pittsburgh, Cincinnati, Chicago & St. Louis.				
1 month.....	Gross	\$1,314,595	\$1,084,420	I. \$230,175
1 ".....	Net	378,333	330,178	I. 48,155

San Francisco & North Pacific.				
7 months.....	Gross	\$529,170	\$447,506	I. \$81,664
7 ".....	Net	221,308	162,156	I. 59,152

BROOKLYN ELEVATED.—Holders of first mortgage bonds of the Sea Side & Brooklyn Bridge Elevated, second mortgage bonds and capital stock of the Brooklyn Elevated, and second mortgage income bonds of the Union Elevated are notified that the second instalment on these bonds is due and payable at the office of the Central Trust Co. of New York, March 7. The first instalment was payable Feb. 7. (See this column for Feb. 4.)

CENTRAL VERMONT.—A bill has been introduced in the Massachusetts Legislature providing for the transfer by this company of its interests as lessee in the New London Northern Railroad. The Massachusetts Legislature in approving this lease made the provision that it could not be assigned without the consent of the Legislature. The New London Northern, which extends from New London, Conn., to Brattleboro, Vt., 121 miles, was leased to the Consolidated Railroad of Vermont Dec. 1, 1891, which lease was assigned later to the Central Vermont. The retention of this road as a part of the Central Vermont lines has an important bearing on the question of guaranteeing by the Grand Trunk of the Central Vermont interest on the new bonds provided for in the plan of reorganization.

CHESAPEAKE, OHIO & SOUTHWESTERN.—The United States Circuit Court at Louisville, Ky., has issued an order directing the Receiver of this road to turn over to the Illinois Central all assets outside of the cash on hand. By the same order the Receiver is discharged and the Illinois Central will hereafter have exclusive management of the road. The Chesapeake, Ohio & Southwestern was purchased on July 25, 1896, by the Illinois Central at foreclosure sale under the second mortgage for \$1,500,000 and possession was taken the following Aug. 1. In May, 1897, the Illinois Central issued a \$200,000 mortgage covering this line.

CHICAGO & WESTERN INDIANA.—Ninety bonds of Nov. 1, 1879, issued under the trust deed, have been drawn for payment on or before May 1 at the office of J. P. Morgan & Co. of New York, at 105 per cent.

CHICAGO, ROCK ISLAND & PACIFIC.—In accordance with the decision to adopt the refunding plan, noted in this column last week, the Board of Directors has called for the payment of the \$40,712,000 of first mortgage extension and collateral 5 per cent. bonds, and \$4,500,000 debenture bonds. These are to be paid at 105 per cent. and interest, the first mortgage extension on April 30 next, and the debenture on Sept. 1.

CINCINNATI, JACKSON & MACKINAW.—Judge Hammond at Toledo, O., has issued an order discharging Frank B. Drake as Receiver of this company. The road was sold Jan. 5, 1897, to the Reorganization Committee, and divided between the Cincinnati Northern and the Detroit, Toledo & Milwaukee. It extends from Dundee, Mich., to Allegan, 133 miles, and from Addison Junction, Mich., to the Cleveland, Cincinnati, Chicago & St. Louis Junction, O., 187.5 miles, with branches, making the total length 408.48 miles.

KANSAS PACIFIC.—By arrangement with the Attorney-General of the United States, the sale of the Government subsidy mortgage was permitted to take place at Topeka, Kan., Feb. 16, the date advertised. The Union Pacific Committee raised its bid to \$6,303,000, which is the face of the Government mortgage. On Jan. 1 last the interest paid by the Government amounted to \$6,582,084, which was not provided for in the sale. The sale of the Kansas Pacific Eastern Division took place at Topeka, Kan., Feb. 17, at the upset price of \$4,500,000. The sale of the Middle Division was held at Salina, Feb. 18, at the upset price of \$5,300,000. The consolidated mortgage sale was held at Topeka, Feb. 19, at \$8,000,000, the upset price. The Denver Pacific first mortgage was sold at Denver, Feb. 21, for \$2,500,000, the upset price. The only bidders in all these sales were representatives of the Reorganization Committee of the Union Pacific. Judge Sanborn, at St. Louis, on Feb. 18, confirmed the sale of Feb. 16 under the new Government lien.

MORRISTOWN & CUMBERLAND GAP.—As announced in this column Feb. 4, this road was sold Feb. 19 to Adolph Segal of Philadelphia for \$61,000. The line extends from Morristown, Tenn., to Corryton, 40 miles.

NEW YORK CENTRAL & HUDSON RIVER.—J. P. Morgan & Co. of New York announce that \$20,000,000 of new bonds have been exchanged under the recent offer, and the company is now preparing to receive \$20,000,000 additional on the same terms with the exception that the price of the new bonds will be 103½ per cent. and interest.

NEW YORK, NEW HAVEN & HARTFORD.—At a meeting of the Directors of this company held in Boston, Feb. 12, a resolution was adopted expressing a willingness to merge the New England on the basis of five shares of New England common stock or two shares New England preferred stock for one share of New York, New Haven & Hartford stock. This has not been accepted, but a counter offer has been made by the New England preferred stock holders' committee. The New England has outstanding \$20,000,000 of common and \$5,000,000 of preferred stock of which the New York, New Haven & Hartford owns \$11,770,000 common and \$1,254,900 of preferred stock. To take up this stock the New York, New Haven & Hartford will be obliged to issue a total of \$3,518,550 of stock.

OGDENSBURG & LAKE CHAMPLAIN.—Judge Cox of the United States Court at Utica, N. Y., Feb. 11, issued a decree of foreclosure and sale of this road, and William H. Comstock of Utica was appointed to conduct the sale, which will take place at Utica at some day and hour to be fixed by the master. The upset price is fixed at \$1,000,000, and bidders must deposit \$100,000 in cash or certified check. This road extends from Rouse's Point, N. Y., west to Ogdensburg, 118 miles. It was leased in perpetuity by the Central Vermont June 1, 1886, but the interest on the bonds has been defaulted since April 1, 1896.

PHILADELPHIA, WILMINGTON & BALTIMORE.—The earnings of this line of the Pennsylvania Railroad, including its controlled lines, for the

year ended Oct. 31, according to the annual report, were as follows:

Year:	1897.	1896.	Inc. or Dec.
Gross earnings	\$8,791,436	\$9,047,131	D. \$255,695
Operating expenses	6,404,205	6,694,007	D. 289,802
Net earnings	\$2,387,231	\$2,353,124	I. \$34,107

The falling off in gross revenues was mainly due to the entire failure of the peach crop on the Peninsula. The company is replacing its light rails with 85 and 100 lb. rails, of which 7,650 tons were laid during the year.

SOUTHERN.—At a meeting of the stockholders held at Richmond, Va., Feb. 18, approval was made of the proposal to acquire the Memphis & Charleston, and the issue of bonds and stock was authorized to effect the same. (See this column for Jan. 23.)

TEXAS CENTRAL.—This company gives notice that on April 1 it will redeem all its outstanding first mortgage 5 per cent. bonds (\$250,000) due 1921, at 105 per cent. and accrued interest, at the office of the Farmers' Loan & Trust Co., New York, and that interest on these bonds will cease on that date.

UNION PACIFIC.—J. P. Morgan & Co. of New York announce that the temporary restraining of delivery of preferred stock under the agreement of Feb. 15, 1897, has been vacated, and that the stock will be delivered hereafter under the agreement. (See this column for last week.) The New England Trust Co. of Boston, Mass., under an indenture of trust dated April 2, 1883, executed by the Union Pacific, will sell at public auction at Boston, March 23, the following securities under William D. Cornish, Special Master: Colorado Central Railroad Co. 7 per cent. mortgage bonds dated July 1, 1879, payable July 1, 1909, with the coupons of and from Jan. 1, 1898, \$1,169,000. Utah & Northern Railway Co. 7 per cent. mortgage bonds dated July 1, 1878, payable July 1, 1908, with the coupons of and from July 1, 1898, \$1,869,000. Omaha & Republican Valley Railroad Co. 7 per cent. mortgage bonds dated July 1, 1879, payable July 1, 1909, with the coupons of and from Jan. 1, 1894, \$573,000. Omaha & Republican Valley Railway Co. 5 per cent. consolidated mortgage bonds dated Feb. 15, 1887, payable March 1, 1927, with the coupons of and from March 1, 1894, \$1,809,000. Oregon Short Line R. R. Co. 5 per cent. first mortgage gold bonds dated March 1, 1897, payable July 1, 1946, with coupons of and from July 1, 1898, \$39,500. Oregon Short Line R. R. Co. Income bonds, Series A, dated March 1, 1897, payable July 1, 1946, with coupons of and from Sept. 1, 1898, \$39,500. Oregon Short Line R. R. Co. common stock, 790 shares. Coupons due Jan. 1, 1894, of Utah Southern Railroad Extension 7 per cent. bonds, 79 at \$35 each, \$2,765.

WASHINGTON & COLUMBIA RIVER.—The Northern Pacific has purchased a controlling interest in this road at a price understood to be \$500,000. The Northern Pacific makes no guarantee on the bonds, but engages to give the road the same traffic percentages as heretofore enjoyed on the new road in effect on a division of the Northern Pacific system. The Washington & Columbia River extends from Pendleton, Ore., to Dayton, Wash., 128.41 miles, with branches from Eureka Junction, Wash., to Pleasant View, 19.73 miles, and to Athena, Ore., to Killian Junction, 14.59 miles, a total of 162.73 miles. The road was chartered Aug. 4, 1892, as successor to the Oregon & Washington Territory. It has a capital stock of \$3,000,000 and a funded debt of \$4,745,000, comprising first mortgage 4 per cent. 40-year gold bonds due Jan. 1, 1935, \$2,500,000 and income 4 per cent. 40-year gold bonds \$2,245,000.

Electric Railroad News.

BALLSTON SPA, N. Y.—Press reports state that at the annual stockholders' meeting of the Ballston Terminal Railroad Co., to be held March 1, a new board of directors will be elected and a new organization effected. John H. Noblit is president of this company and C. E. Lent, secretary, both at Bourse Building, Philadelphia.

BALTIMORE, MD.—The formal transfer of the Central Railway Co. to the City Passenger Railway has been completed. Walter S. Franklin has been elected president of the united companies.

William L. Marbury, Trustee, 922 Equitable Building, Baltimore, has advertised the sale of the Columbia & Maryland Railway, to take place March 25.

OTTAWA, ILL.—Press reports state that M. T. Moloney, former Attorney-General of Illinois, bought the Ottawa Street Railway Co., recently reported as in the hands of a receiver.

TRAFFIC.

Safety-Paper for Tickets.

The firms who print coupon railroad tickets held a meeting at Washington, D. C., last week and formed an association, the principal object of the organization being to facilitate co-operation in the use of safety paper, which will soon be required by all of the principal railroads in the General Passenger and Ticket Agents' Associations. The representatives present at Washington were: W. H. Woodward of the Woodward & Tiernan Printing Company of St. Louis, R. S. Gardiner of Rand-Avery Supply Company of Boston, John Reed of Rand & McNally Company of Chicago, William Poole of Poole Bros., Chicago; James M. Ruso of Weed-Parsons Printing Company of Albany, N. Y.; Alexander S. Calhoun of Stevenson & Foster Company of Pittsburgh, Pa.; C. G. Crawford of Wynkoop, Hallenbeck Crawford Company of New York, George W. Hawkins, Jr., of the American Bank Note Company of New York, F. C. Nunemacher of Louisville, Ky.; J. L. Greaves of Stromberg, Allen & Company, Chicago; John B. Kurtz of J. D. Lucas Printing Company of Baltimore, S. Spencer of Spencer & Craig, Cincinnati, Ohio; Mr. Stone of the Stone Printing Company, Roanoke, Va.; Mr. Scott of Allen, Lane & Scott of Philadelphia, Pa.

Mr. W. H. Woodward of St. Louis, was elected president and James M. Ruso of Albany, secretary.

Canadian Pacific Competition.

The Interstate Commerce Commission has suspended the long and short haul law, so far as it affects passenger business which is computed for by the Canadian Pacific between the Province of Manitoba on the west and Canadian points east of Detroit, including New England points reached through Canada, on the east. The Canadian Pacific has made radical reductions in the fares from the East, not

only to Manitoba but to Pacific Coast points, and it is said that the railroads this side of the line will apply for an extension of the Commission's order to include transcontinental traffic.

The rates announced by the Canadian Pacific to the Pacific Coast are, from all points east of Buffalo, \$40 first class and \$30 second class, the regular rates being \$79.25 and \$67.40, respectively. The Canadian Pacific officers state in newspaper interviews that they are simply maintaining their differential; that the American lines have made secret reductions, and the prices now announced simply make those reductions public. The Canadian Pacific also announces that it will make a reduction of 30 per cent. in the rates from New England and New York to St. Paul, making the first class rate \$18 and the second class \$17.

Proposed Two Cent Fare Law in Ohio.

Mr. E. A. Ford, General Passenger Agent of the Pennsylvania Lines west of Pittsburgh, in his argument recently presented to the Ohio Legislative Committee, against the proposed law limiting all passenger fares in that State to two cents a mile, said that during the year 1897 reduced fares were granted by the railroads for 124 public assemblies, or more than one for every three days during the year. During the same time there were 263 similar reductions to places outside of Ohio, from points within the State, making 387 reductions in all, or an average of more than one every day. Mr. Ford gave statistics of the average receipts and expenses per passenger mile on different divisions of the Pennsylvania Lines west of Pittsburgh, some of them showing a loss of two mills a mile or more. On one of the smaller divisions the average cost was over seven cents a mile, so that there was a loss of four cents a mile on every passenger carried.

President Callaway of the Lake Shore and Nickel Plate roads, in an interview in the Cleveland Plaindealer, has given the Legislature some points that ought to cool their ardor. He says: "The daily train earnings sheets of the Lake Shore show that there are only ten or twelve of the trains on the whole road that are earning over \$1 a mile, and the great bulk of them earn less than 50 cents a mile—in fact, a great many local trains do not meet their expenses. Quite a large number of local trains earn only from 10 to 50 cents a mile. None of the Nickel Plate passenger trains are profitable, but it is necessary to have a fairly good train service in order to induce people to locate their factories and other freight industries along the road."

"If the 2-cent fare act at Columbus is passed," said Mr. Callaway, "it will simply result in the Lake Shore Company's being obliged to abandon a large portion of its local passenger trains. They do not pay now, and with the revenue cut down one-third, the company certainly could not afford to continue them. The reduction would also compel the discontinuing of the use of special, excursion or round trip tickets."

A remonstrance against the 2-cent fare bill has been sent to the Legislature by several hundred passengers near Cincinnati, who ride to that city on commutation tickets. The remonstrants fear that if the local single trip fares are reduced the railroads will have to advance their season ticket rates.

Chicago Traffic Matters.

Chicago, Feb. 23, 1898.

The entire attention of the western passenger world is now centered on the war over passenger rates with the Canadian Pacific. It practically means the disturbing of all these rates in the vast western territory. The Canadian Pacific has cut rates from coast to coast so low that in order to maintain other rates the western roads will have to go out of the trans-continental business until the trouble is settled. The roads in the Western Passenger Association have taken the aggressive and thrown the Canadian Pacific out of the Immigrant Clearing House, and they expect that this will shut that road out of any immigrant traffic arriving at New York and Boston. The same lines, in order to carry the fight against the Canadian Pacific still further, have applied to the Interstate Commerce Commission to have the long and short haul clause suspended on trans-continental business. Something of a sensation has been caused by the discovery that the Union Pacific has made an agreement with Peter McDonald of New York in regard to the handling of immigrant traffic. McDonald was some time ago discharged by the association as an agent of the Western Immigrant Clearing House. The Union Pacific is reported to be paying him a commission of \$18 a ticket on California business, while the lines in the association are paying authorized agents only \$4.50.

The Alton road has established a tourist car line to run weekly between Chicago and Portland, Ore., in connection with the Missouri Pacific and the Denver & Rio Grande.

The M., K. & T. last week took 8½ cents off packing house products between Kansas City and Mississippi River points, which forces a reduction on these rates to Chicago from 23½ cents to 15 cents. The Chicago-St. Paul lines announced a rate of 21 cents on grain from St. Paul to the seaboard, to meet Soo competition. This is a cut of 5 cents.

West bound freight traffic from Chicago is now said to be heavier than it has been at any time since 1892.

Western passenger men are considerably upset over reports that come from Washington that the Senators are so loading up the anti-scalping bill with amendments that the measure will fail to pass.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the western termini of the trunk lines for the week ending Feb. 17, amounted to 170,775 tons, as compared with 99,714 tons the preceding week.

This statement includes 104,763 tons of grain, 18,939 tons of flour and 15,677 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	Week Ending February 17.		Week Ending February 10.	
	Tons.	P. C.	Tons.	P. C.
Baltimore & Ohio	7,246	4.3	8,796	8.9
C., C. & St. Louis.....	24,458	14.3	4,101	4.1
Erie	14,562	8.5	11,175	11.1
Grand Trunk	20,564	12.1	12,727	12.7
L. S. & M. S.....	26,217	15.3	15,434	15.4
Michigan Central	19,611	11.5	12,142	12.1
N. Y., Chi. & St. L.....	12,547	7.4	9,503	9.5
Pitts., Chi. & St. L.....	13,516	7.9	10,290	10.3
Pitts., Ft. Wayne & Chi.....	21,411	12.5	12,837	12.8
Wabash	10,643	6.2	2,709	2.7
Totals	170,775	100.0	99,714	100.0